POOR LEGIBILITY

ONE OR MORE PAGES IN THIS DOCUMENT ARE DIFFICULT TO READ DUE TO THE QUALITY OF THE ORIGINAL

1955
v12

Work Plan

Remedial Investigation / Feasibility Study for the GE Stanford Ave. Site

Prepared for
GE Corporation

by
Bechtel Environmental, Inc.
San Francisco, CA

Submitted September 1987

Revised March 1988

Bechtel Environmental, Inc.
Engineers - Constructors

Fifty Beale Street
San Francisco, California
Mail Address: P.O. Box 3965, San Francisco, CA 94119

March 29, 1988

Mr. John Harrsen
General Electric Company
One River Road
Schenectady, New York 12345

Subject: Additional Revisions to the Remedial Investigation (Feasibility) Study (RI/FS) Work Plan for GE Stanford Avenue

Dear Mr. Harrsen:

Please find enclosed five (5) copies of the revised work plan for the subject site. Please note that additional revisions, per your request, have been included. Additionally, computer generated graphics (Auto-CAD) showing site conditions as they exist presently will be forthcoming, pending completion and review.

The specific revisions per your request are as follows:

- <u>Page 3-3</u>

  The second paragraph has been revised to state the conclusions of the Boyd Report. Supporting discussion and extracts from the Boyd Report can be found in Appendix A-4. Appendix A-4 has been revised to support Page 3-3, Evaluation of Existing Data.

- <u>Appendix B</u>:

  Section 2.4 of Appendix B has received several major revisions. Page B-4 has been revised to eliminate three on-site wells to two on-site wells and one upgradient off-site well. Changes for the construction materials for the on-site wells have been made. Figure 2-1 and Table 2-2 of Appendix B have been revised accordingly. The changes for further investigation and analytical parameters have also been made.

- <u>Miscellaneous</u>

  A number of drawings have been replaced with clearer versions.

I hope you find these revisions suitable for your requests. Should you have any questions or comments please call me at (415) 768-0777.

Sincerely,

Richard L. Morales

Richard L. Morales

RLM/cab
Enclosures

Work Plan

Remedial Investigation / Feasibility Study for the GE Stanford Ave. Site

Prepared for
GE Corporation

by
Bechtel Environmental, Inc.
San Francisco, CA

Submitted September 1987
Revised March 1988

REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORKPLAN

FOR THE

GE STANFORD AVENUE SITE

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

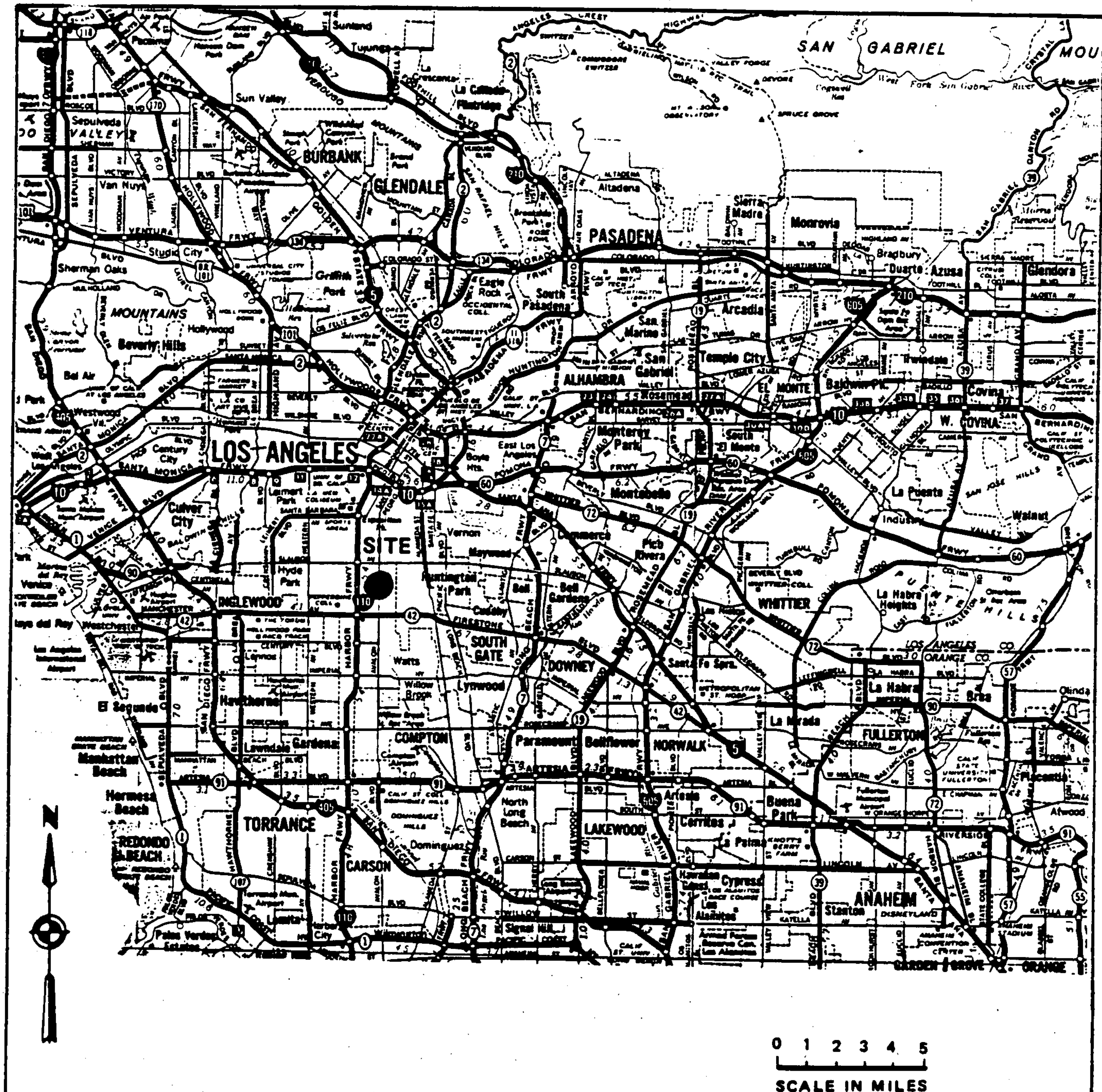
Section 1

INTRODUCTION

The purpose of this work plan is to address previous site investigations, identify data deficiencies, determine additional site investigation activities, and develop an acceptable and achievable remediation program as determined by a feasibility study. The facility is located at 6900 Stanford Avenue in Los Angeles (see Figure 1-1). The site is situated in a light industrial and commercial area and is approximately 60,000 square feet. It contains two brick wall wood roof buildings having the dimensions of 300 ft x 100 ft; 300 ft x 50 ft. In addition, in the northwest corner of the property is a small 30 ft x 50 ft building. The property is bounded to the west by Stanford Avenue; the east by the Southern Pacific Railroad spur; the north by the Sinclair Paint formulation facility; and to the south by David Cooper Drum Recycler and Reconditioners (see Figure 1-2). Other commercial activities occurring in the vicinity of the site include a tank manufacturer, furniture manufacturer, and a mattress and bedding operation. The site is secured with a chain-linked fence and there are no residential areas within the immediate vicinity of the site.

1.1 SITE HISTORY

At various times, there have been several different users of the buildings at the site. Automatic Screw Machine Company had responsibility for the building and site in 1942. In 1946, the General Electric Company purchased the property and operated it as a service and maintenance shop until 1971. Activities at the shop included repair and refurbishing of electrical transformers and other components. As part of the maintenance activities, transformer oil was pumped or drained and replaced. Some of the oil contained PCB. It is possible that during GE's operation, there may have been uncontrolled spills or discharges of oil containing PCB in some areas of the plant property.

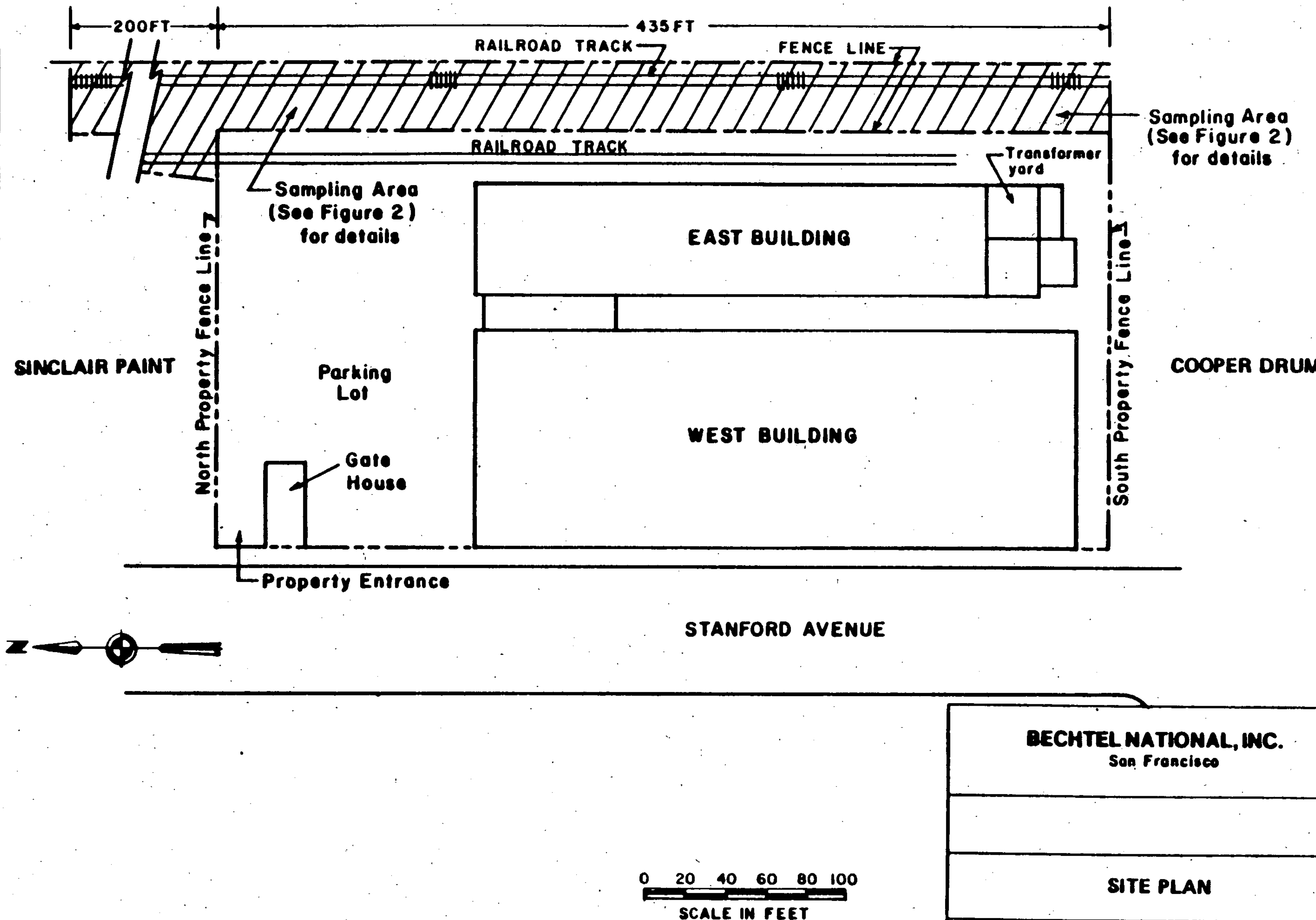


BECHTEL NATIONAL, INC.
SAN FRANCISCO

SITE LOCATION

BECHTEL JOB NO	
17282-001	

	DRAWING NO.	REV.	DATE
	FIGURE 1-1		



BECHTEL NATIONAL, INC.
San Francisco

SITE PLAN

BECHTEL JOB NO.
17282-001

DRAWING NO. | REV. | DATE

FIGURE 1-2

In 1971, GE sold the property to Endura Metals, Inc., which manufactured stainless steel counters and sinks.

In January 1983, the U.S. Environmental Protection Agency received an unsigned letter charging that PCBs had been disposed of at the GE Stanford Avenue Facility. This letter also indicated that dioxins had probably been in the oil that was disposed. As a result of the letter, a series of investigations and activities were initiated which are summarized in Table 1-1. Significant activities since the allegation are briefly described below.

In March 1983, the L.A. County Department of Health Services (LACDHS), responding to the unsigned letter, performed an on-site inspection of the facility. Soil samples were collected and the presence of PCBs was confirmed by laboratory analyses. The concentration of PCBs ranged from 13 to 1200 parts per million (ppm). Because the PCBs levels exceeded the 50 ppm action level for soil, the LACDHS directed GE to prepare a work plan for cleaning the contaminated areas.

During the period of April 1983 to November 1983, Brown & Caldwell conducted a site investigation at the facility to characterize the extent and magnitude of the PCB contamination. General Electric submitted a investigation plan for the site to the LACDHS. The investigation began and preliminary sampling indicated "hot spots" with concentrations exceeding 30,000 ppm. PCB contamination was also identified in the two buildings.

GE then submitted a remedial action plan to the LACDHS. LACDHS approved the remediation and set the cleanup level at 50 ppm for contaminated soil and 90 mg/100 cm^2 for concrete.

Between June and August 1984, Brown & Caldwell began and completed a program to decontaminate the facility and excavate contaminated soil. Soil behind the east building was removed to depths in excess of 5 feet deep and clean fill was brought in to replace it. Contaminated soil along the railroad tracks was also excavated. The floors in both the east and west buildings were scrubbed to remove any surface contamination. Post-excavation and decontamination testing revealed that areas of PCB contamination were still present.

Table 1-1

STANFORD AVENUE PROPERTY
CHRONOLOGY OF EVENTS

April 1983	Notification letter from LACDHS directing GE to clean up.
November 1983	Site investigation complete; remedial plan submitted to LACDHS.
May 1984	Contract awarded for cleanup work.
June to August 1984	Cleanup carried out.
September 1984	Post-cleanup verification sampling reveals residual contamination.
January 1985	Second-round cleanup carried out; storm event leaves contaminated silt in buildings.
May 1985	Samples of dust taken from inside the building.
July 1985	Cleanup plan for railroad track area submitted to LACDHS.
September 1985	Presence of dioxins and dibenzofurans in dust samples confirmed.
October 1985	LACDHS rescinds approval to proceed with railroad track area cleanup.
December 1985	Plans for additional testing for dioxins and dibenzofurans reviewed with California Department of Health Services.
January 1986	Endura Metal Products vacates the premises.
March 1986	Testing for dioxins and dibenzofurans carried out.
April 1986	Plan for interim remediation at rail spur reviewed with LACDHS.
April 1987	Final report on dioxin and dibenzofuran testing program issued.
April 1987	Consent Order requiring site cleanup by 1988 issued to GE for comment by the California DOHS.
July 1987	GE provided comments to DOHS on Consent Order and began preparation of a detailed work plan.

In November 1984, GE retained Bechtel National, Inc. (Bechtel) to evaluate the previous remedial activity and manage the cleanup of the paved area (asphalt and concrete) surrounding the site.

In January 1985, Chemical Waste Management, Inc. was subcontracted by Bechtel to clean the exterior surfaces. The asphalt, concrete surfaces and storm drains were hydroblasted. Contaminated soil generated during the cleaning was collected and disposed of.

Concurrently or immediately preceding the outside cleaning, a large storm caused flooding at the site. Floor waters deposited silt inside the east building and generally distributed soil from the railroad right-of-way throughout the back area of the site.

As a result of the flood, areas that had been decontaminated were thought to be recontaminated. In February and March 1985, Bechtel collected samples from the railroad right-of-way and other areas. Analysis of the samples confirmed that cleaned areas had become recontaminated.

In March 1985, Chemical Waste Management, Inc. returned to the site and conducted the floor cleaning task. The floors were scrubbed using a carbide-impregnated bristle brush and cleaning solution. The concrete floor in the east building and part of the floor in the west building were cleaned. This activity occurred while Endura Metals was still occupying the facility.

Beginning in July 1984 Endura Metals, Inc. retained Med-Tox Associates to monitor employee exposure to PCBs. In addition, Med-Tox conducted tests to identify contaminated areas within the Endura Facility. As part of the exposure-monitoring program, Med-Tox also monitored for the presence of dioxins. Sample locations and analytical results for PCBs, dioxins, and furans are presented in Appendix A-3. Although the personnel monitoring analysis showed that concentrations were below regulatory standards for PCBs and dioxins, Med-Tox did find wipe samples from the floor ranging from 5 to 4000 mg/100 cm^2 PCBs. Sampling of soil around the exterior areas of the site also revealed PCBs contamination ranging from 130 ppm to 15,000 ppm. Based on these figures and the potential for exposure resulting from dust generated by normal work activity, Med-Tox concluded that there was a potential health hazard to Endura personnel and recommended that until remediation activities were completed, work should be conducted elsewhere.

In January 1986, Endura Metals, Inc. vacated the property and returned responsibility and ownership of the site back to GE.

In March 1986, Bechtel and Boyd Associates conducted an air sampling program at the facility to determine if any deleterious air emissions were occurring. Results of the analysis indicated that no air-borne contaminants were present (including dioxins) at levels that would present a hazard to personnel at the site (see Appendix A-4).

In March 1987, Bechtel performed additional sampling of the east and west concrete floor to determine the extent of contamination into the floor. Bechtel took 47 corings throughout the buildings and analyzed the concrete for PCBs at various depths. The results of the investigation indicated that there are "hot spots" at various locations the floors. In some cases, the contamination extends through the floor; however, very little contamination of soil beneath the concrete was detected.

On April 29, 1987, the California Department of Health Services issued a Consent Order to GE, for review, addressing the condition of the Stanford Avenue site. The order requested that GE provide a work plan to the state for contaminant investigation and remediation at the facility. The order also required GE to complete the remediation activities by June 1988.

Concurrent with site remediation activities pertaining to PCB contamination and cleanup are activities associated with the removal of ten underground storage tanks located at the southeast corner of the property. Although this activity is not included as part of the consent order, any data generated during the removal activities that have a bearing on the overall site investigation will be included in the final report.

Section 2

TECHNICAL APPROACH

This work plan has been developed on the basis of published data, the results of previous site investigations, experience at other contaminated sites, and regulatory guidelines and regulations related to investigation and cleanup of site contamination. It outlines additional work to be performed to determine the magnitude and extent of site contamination, the source of contamination, and the potential effects of this contamination on public health and the environment. It also outlines work to be performed to develop a cost-effective remedial action for the abatement of site contamination.

The general approach to the work is described below.

2.1 REMEDIAL INVESTIGATION

The remedial investigation consists of two parts: 1) continued evaluation of existing data and 2) site characterization. The evaluation of existing data and site characterization are discussed in Sections 3.0 and 4.0 of this plan.

Previous investigations have developed substantial data addressing the degree and extent of contamination at the site. However, identification of specific sources of the present contamination has not been possible. Existing information on hazardous waste sources, pathways, and receptors has been reviewed for completeness and reliability. Previous investigations have identified potential contaminant sources. These include the Santa Fe/Southern Pacific railroad track area, the exterior of the facilities and the interior of the buildings. Contamination levels in these areas will be evaluated and considered in the development of plans for any additional data collection. Migration pathways of PCBs will be evaluated by examining site conditions (e.g. surface waters flow and direction), properties of soils, movement of PCBs in soils, potential transport by airborne dust, and existing literature. The potential for contaminant migration to the ground water and in the air will be addressed. Based on the data evaluation, general response actions for soil, surface water, ground water, and air will be developed. The identification of general response actions will help to ensure that additional data collected will be sufficient and appropriate to ensure a responsive remediation.

The exposure assessment will address current levels of contaminants, environmental transport, and exposure pathways for populations at risk. Existing reports on exposure potential at the site indicate that there is little potential for exposure based on air pathways. Ground water also may to be a relatively minor pathway due to its depth and the unlikelihood of PCB transport through such a large soil gradient unless carried in a more mobile material such as a solvent. Depth to ground water is thought to be 200 feet. Previously identified contamination appears to be limited to the top 10 feet (see Appendix A-1 Brown and Caldwell 1984).

The field investigations performed as part of the site characterization will be carried out in accordance with the following supplementary plans:

- Sampling Plan
- Health and Safety Plan
- Quality Assurance Plan

All of these plans are attached documents that describes procedures which will be followed during the field investigation as well as analytical parameters to be measured (see Appendices B, C, and D).

2.2 FEASIBILITY STUDY

Feasibility study activities will begin with the identification of general response actions in the early stages of a remedial investigation. As the data base becomes complete, the general response actions will be revised as the investigation progresses. When site characterization is near completion, the specific remedial technologies which address each of the general response actions will be identified. These technologies will be screened initially to eliminate technologies which are unproven, costly, or highly unlikely to satisfy remedial objectives.

Technologies which survive the initial screening process will be grouped into remedial alternatives which satisfy various criteria (e.g., alternatives which attain applicable and relevant public health and environmental standards). The resulting list of alternatives will include a "no action" alternative. Alternatives will then undergo a cursory screening on the basis of factors such as environmental impact, public health and order-of-magnitude cost.

Detailed evaluation of the alternatives will include the development of conceptual level designs and cost estimates for each alternative and evaluation and relative ranking of the alternatives using technical, institutional, public health and environmental criteria. The evaluations will be used to prepare a summary of remedial alternatives. The individual steps of the feasibility study are described in Section 6.0.

Section 3

EVALUATION OF EXISTING DATA

Much data related to contamination and its potential migration at the General Electric (GE) facility are currently available (see Appendix A). This section summarizes relevant existing information and attempts to identify data gaps to be filled by the site characterization activities outlined in Section 4. The summary of existing information also lays the foundation for the general response actions introduced at the section's conclusion.

3.1 POTENTIAL CONTAMINANT SOURCES AND CHARACTERISTICS

Potential contaminant sources are, for the purposes of this work plan, defined as areas where spills, leaks, and/or discharges are most likely to have occurred and where contaminants may still be present at the surface or in the subsurface materials. These areas are referred to as potential sources because, if contaminants are present, they may act as sources of contamination likely to migrate to the various receptors. GE does not have any formal records of site waste disposal practices from 1946 to 1971, but discussions with GE personnel and information from a letter from an anonymous informant indicate that there may have been several potential contamination sources. Two potential source areas which have already undergone extensive investigation, remediation, and subsequent recontamination have been identified in this work plan: 1) the railroad right-of-way and associated sump 2) and the buildings and appurtenances.

3.1.1 Railroad Right-of-Way and Associated Sump

Soil contamination in the train unloading area was first investigated in 1983 by Brown and Caldwell (see Reference 1). Brown and Caldwell drilled nine borings adjacent to the railroad track. The depths of the borings ranged from surface to 20 feet. Based on the results, Brown and Caldwell planned the excavation of soil along the railroad right-of-way. This is the area where train cars were unloaded, smaller transformers, potentially contaminated with

PCB's, were drained into the concrete storage sump. Photographs and discussions with GE personnel suggest that the sump area was adjacent to the railroad right-of-way on the east perimeter of the property.

In most parts of the train unloading area, contamination was limited from the surface to two feet in depth. The next 2 to 10 feet of soil, typically showed levels of contamination tapering off to below the detection limits. Subsequent sampling after a localized flood indicated that the previously excavated areas have been recontaminated, at least on the surface. Future site soil investigations will include additional surface sampling and borings along the right-of-way to establish surface contamination and the verticle extent of contamination, if any.

3.1.2 Buildings and Appurtenances

From 1949 to 1971, electrical transformers were drained, dismantled, and rebuilt in the buildings. Discussions with former GE personnel did not clarify the exact location of these activities within the building, although there are areas in the building where contamination exists.

In March 1987, 47 concrete boring samples and 40 soil samples were collected from the floors inside and beneath both buildings and analyzed for PCBs. PCB concentrations ranged from 21 mg/kg (ppm) to 4000 ppm on the surface. PCB concentrations decreased considerably with depth in each concrete core sample. Soil samples analyzed below each core sample contained PCBs in the range of nondetectable to 1.3 ppm, with one sample showing an elevated level of 1040 ppm (see Appendix A-5). Because general trends indicate that PCB contamination is high at the surface of the floor and is nearly absent at the soil level, no further investigation is planned for this area.

The interior walls of the buildings have been identified as potential sources of residual contamination because most PCB handling activities were inside the building. Brown and Caldwell (see Reference 1) collected several wipe samples from the brick walls and detected very low concentrations (less than 1.0 ug/cm^2) of PCBs. Additionally, one well core sample was collected and analyzed. It showed PCB contamination at 1300 ppm near the northern roll-up door in the east building. One other investigation conducted by Daniel P. Boyd and Company included wipe samples of the walls. Results of the analyses showed nondetectable levels for PCBs for all samples (see Appendix A-4). This area requires limited investigation to verify if any contamination exists within the walls or the building.

The interior ceilings of the buildings have been identified as a potential areas of contamination. Visual observations of "stained" or "charred" surfaces prompted Med-Tox (see Reference 2) to conduct an investigation for PCB, dioxins, and furans contamination in the ceiling for Endura Metals. Although the Med-Tox investigation indicated dioxins and furans contamination exists in the ceiling, both the Med-Tox and the Boyd investigations showed the level of 2,3,7,8-tetrachloro-dibenzodioxin (TCDD) isomer was nondetectable or less than one part per billion (ug/kg). Results and a discussion of relative toxicity of dioxins and furans and the conclusions extracted from the Boyd investigation (based on the Toxicity Equivalence Factors, see Table 3-1) are found in Appendix A-4.

Past investigations indicated that cracks, valve boxes, sumps, pipes, and other appurtenances on the floors of the buildings are potential sources of contamination. In general, concentrations of PCB contamination above the levels detected in the floor have been detected in these areas. Some further investigation of cracks, valve boxes, sumps, pipes, and other appurtenances areas will be evaluated. However, the individual concrete cores taken in the floors of the buildings will be utilized in evaluating remedial options during the feasibility studies.

Table 3.1

TOXICITY EQUIVALENCE FACTORS FOR PCDD AND PCDF[1]

HOMOLOGUE CLASS	EQUIVALENCE FACTOR[2]
Tetra CDD	1.00
Penta CDD	1.00
Hexa CDD	0.03
Hepta CDD	0.03
Octa CDD	0.00
Tetra CDF	1.00
Penta CDF	1.00
Hexa CDF	0.03
Hepta CDF	0.03
Octa CDF	0.00

(1) As described in "Health Effects of 2.3.7.8- Tetrachlorodibenzo-p-dioxin and Related Compounds". (Scenario 4). California Department of Health Services. Epidemiological Studies Section. December 27. 1985

(2) TEF values apply only to isomers within a homologue class that are chlorinated in the 2.3.7.8 position

3.1.3 Exterior Facilities

Contamination around the exterior of the buildings was investigated extensively in the period of 1983 to 1985, by GE and Endura Metals. Results indicated PCB contamination along the eastern and southern portions of the site. The northern portion of the site didn't show PCB contamination. Remedial activities in the contaminated areas were performed to bring the levels of contamination below action levels. Migration from contaminated areas may have recontaminated previously cleaned areas. Limited investigation is required for all exterior facilities.

3.2 MIGRATION PATHWAYS

Potential contaminant migration pathways at the GE site include surface water, air and ground water. Existing information related to these pathways is summarized below. Important data gaps are also discussed.

3.2.1 Potential for Contamination Migration in Surface Water

Because the majority of the GE site is paved, a majority of the site runoff is transported down the breezeway between the buildings through the east building and deposited on the railroad right of way. Due to cracks and the porous nature of concrete, contaminated sediments imbedded in these areas may be dislodged and brought to the surface during surface water runoff.

Surface water runoff from potentially contaminated site areas is generally in a northeastward direction. Drainage along the railroad right-of-way is to the south. Although PCBs are essentially insoluble in water, PCB laden particulates, such as dust, soil and other solids, may migrate when rainfall is sufficiently heavy and surface runoff spreads contamination through both buildings, and along the railroad right-of-way. Surface water eventually evaporates leaving contaminated sediments deposited in these areas.

Sampling results received following floor decontamination in September 1984 and subsequent flooding in January 1985 show the possibility that contamination from surface water runoff exists.

3.2.2 Potential for Contamination Migration in Air

Air was thought to be a significant migration pathway for contaminants at the G.E. site, since airborne particulates laden with contaminants, pose a threat to air quality during worker remedial action activities in and around the site (see Reference 2).

High levels of airborne particulates may be anticipated during such activities as ventilation, wind, forklift activities, etc. From July 1984 through March 1985, Med-Tox collected airborne samples from all areas on the site and the samples were determined to have concentrations below the detection level. These tests were conducted prior to the flooding in January 1985, subsequent surface samples demonstrated higher levels of contamination than previously experienced.

As a result of the Med-Tox investigation for dioxins and furans, Bechtel hired Daniel P. Boyd and Company to conduct more extensive air monitoring tests for these parameters. During a six day period (March 3-8) in 1986, Daniel P. Boyd and company performed airborne evaluation of polychloronuclear aromatic compounds in both buildings at the site. Results, as discussed in Section 3.1.2, indicated that the polychloronuclear aromatics were no greater than background levels, and migration of these parameters by this pathway does not appear to occur.

Potential for PCB contamination migration in air may still be possible during periods of high dust generating conditions such as high windstorm or remedial action activities. However, these will occur over short periods of time and can be mitigated by normal control measures during remedial action.

3.2.3 Potential for Ground-Water Contamination

Contaminated soils in the former sump area and the railroad right-of-way are possible sources of ground-water contamination by rainwater percolation and leaching. Studies have determined that PCBs (especially Arochlors 1242 and 1260) are nearly insoluble in water and bind tightly with soils and sediments (References 6, 7 and 8). Additionally, the Brown and Caldwell investigation found no PCBs below ten feet above analytical detection limits (see

Appendix A-1). PCBs are also very persistent in the environment and degradation is minimal. Analysis of data from previous reports indicate that PCB's contamination in these areas, is limited to the surface soil area. Preliminary review of regional geology and hydrogeology suggests that the site is underlain by unconsolidated sediments which may be water-bearing to depths of as much as 1500 feet. Depth to water table is expected to be at least 200 feet. Regional flow direction is toward the west or southwest; however, there appear to be water-supply wells to the east which may influence local flow conditions.

According to DOHS, there has been no evidence of any ground-water contamination connected with the site. The known soil contaminants, PCB, dioxins and furans, are not readily soluble and are not likely to be found in ground-water. However, DOHS has expressed concern that solvents and other chemicals may have been used at the site; therefore, ground-water quality at the site should be determined. In the general area, the Los Angeles Regional Water Quality Control Board has information on two water-supply wells whch have low concentrations of PCE and TCE but no data exists on PCBs.

3.3 CONTAMINANT RECEPTORS

Land use in the immediate surrounding areas is limited to light commercial and industrial activities. The GE site is completely enclosed with a chain link fence and locked gates. Potential contaminant receptors within the site would include people who enter the facility and stray animals small enough to pass through or under the fence and posts. The railroad right of way has public access. Potential receptors include humans, animals and vegetation. No data on potentially susceptible animals and vegetation exists. The right of way is used infrequently in the surrounding facilities, and it is concluded that humans are rarely a potential receptor in this area.

3.4 ENVIRONMENTAL IMPACTS

Assessing the impacts of contamination on the environment involves evaluating the potential effects of hazardous substances on public health and the environment in terms of contaminant migration pathways and receptors. Partial assessments of environmental impacts have been completed.

Toxicity data of the known contaminants have already been addressed in previous reports (see References 1, 2, and 3). Possible routes of contaminant exposure have also been identified. The route of contaminant exposure thought to have the greatest potential impact at this time is inhalation of airborne particles. Two studies previously mentioned show that this is not a problem.

Other possible routes include dermal contact and ingestion. Neither of these routes is currently thought to be of major significance.

3.5 GENERAL RESPONSE ACTIONS

Based on an evaluation of existing data, general response actions have been identified which may help control or eliminate contaminant migration through each of the pathways previously discussed: surface water, air, and ground water.

3.5.1 Soil

Remedial response actions for soils will be aimed at (1) preventing or minimizing further spread of soil contamination, and (2) isolating the contaminated soil to prevent or minimize direct contact between contaminated soils and humans and animals. Actions which are currently considered likely candidates for later evaluation include:

- Complete or partial excavation
- On-site treatment and replacement
- Containment (e.g., encapsulation)
- Fixation

If contaminated soils are found at various depths and locations throughout the site, more than one general response action may apply.

3.5.2 Surface Water

Remedial response actions for surface water will be aimed at (1) preventing on-site contaminated water from migrating offsite and, (2) preventing offsite water from running onto the site. General response actions may include:

- Surface-water controls (e.g. construction of berms and dikes, surface sealing)

- Contaminated soil containment

- Runoff collection (if necessary)

3.5.3 Air

Remedial response actions for air will be aimed at minimizing dust generation during remedial activities. Many of the same general response actions listed for contaminated soils might also eliminate air contamination problems. These actions include:

- Complete or partial removal of contaminated soil, dust, flooring, and loose ceiling and wall debris

- Onsite excavation

- Contaminated soil, floor, ceiling and wall containment

As data are collected during the site characterization outlined in Section 4, the list of general response actions presented in this subsection will be periodically reviewed for completeness and, if necessary, revised. When site characterization is essentially complete, the list of general response actions will be used as the foundation for the identification of remedial technologies and the development of remedial alternatives carried out during the Feasibility Study as described in Section 5.

Section 4

REMEDIAL INVESTIGATION/SITE CHARACTERIZATION

The purpose of the site characterization is to collect and assess data needed to better define the site problem and to identify and evaluate site remedial alternatives. Several areas of the GE site have been characterized; findings in these areas were summarized in Section 3. The activities described in this section are designed to characterize other, as yet uninvestigated areas of the site, as well as to complete or verify characterization of those areas for which data already exist. Specifically, the work described in this section is intended to eliminate the data gaps identified in Section 3.

The site characterization work will consist of four tasks:

Task 1: Field Investigation

Task 2: Technology Review and Evaluation

Task 3: Contamination Assessment

Task 4: Preparation of Remedial Investigation Reports

The final remedial investigation report will address the findings of site characterization Tasks 1 through 3, incorporating the existing data summarized in Section 3 where relevant and appropriate.

4.1 TASK 1: FIELD INVESTIGATIONS

The field investigations which will be conducted as part of this task are the mechanism by which most of the data needed for complete characterization of site contamination will be collected. An overview of the types of samples to be collected and analyzed, the types of tests and surveys to be performed and the methods of sample collection and testing is presented in this section. A detailed description of sample locations and analyses to be performed and the rationale for their selection will be presented in a separate site sampling plan. Detailed procedures for sampling, analysis, and field measurements will be presented in a Quality Assurance Plan. The field investigations described below address each of the possible migration pathways: soil, surface water, air and ground water. Although these investigations in some cases overlap, the investigations are described individually for clarity in presentation.

4.1.1 Surface/Subsurface Contamination Investigation

Railroad Track and Right-Of-Way. A previous investigation (Bechtel, April 1985) showed that the surface of the excavated area behind the east building including the railroad track has become recontaminated with PCBs, or that the previous excavation effort did not remove all contamination. A large data base is available that addresses surface soil contamination in this area. However, data are limited on the vertical extent of this contamination. Several borings will be made in areas where high levels (>50 ppm) of PCBs have been identified. The location of boring and sampling depths is discussed in the Sampling Plan (see Appendix B).

Previous subsurface sampling by Brown and Caldwell (1984) revealed that below ten feet little or no contamination was present (see Appendix A-1). Based on these findings, borings will be five feet deep, with an average of four samples taken per boring.

Exterior Surfaces. Although the concrete area surrounding the buildings was previously cleaned and decontaminated, no verification sampling was performed. To verify that the paved areas are clean, composite dust samples will be collected from the concrete pad behind the east building and from the asphalt covered areas.

Composite samples will be collected at 50 foot intervals behind the back building and from the asphalt area. In addition, one composite sample will be collected from the asphalt area on the north side of the property.

Interior Walls. Wall samples collected by Brown and Caldwell were limited to 2 to 3 wipe samples and one coring (August 31, 1984). The results from this investigation were declared invalid because of the high discrepancy in the reported analyses. Therefore, very little is known about the inside walls. Mex-Tox, however, did report that wipe sampling was not an effective method to collect wall or floor samples. The Boyd investigation also indicated nondetectable PCBs contamination by the wipe sampling method. Core samples of the interior walls will be collected, in the vicinity of the Brown and Caldwell core sample, to verify if the PCB contamination found in that one wall area was valid. Results of this limited investigation will determine the need for further investigation in this area.

Ceilings and Floors. Previous investigations pertaining to contamination of the ceilings have generated a sufficient amount of information to warrant no further sampling activity. (Boyd, 1987; Med-Tox, 1985). In addition, during April 1987, Bechtel collected and analyzed 47 concrete coring from the floors of both buildings. Results of this report are summarized in Appendix A-3 and A-4 of this workplan.

4.1.2 Ground-Water Investigation

In conversations with the Regional Water Quality Control Board (RWQCB), it was determined that depth of ground water is approximately 200 feet. Past investigations have determined that PCBs contamination was no deeper than 10 feet (Appendix A, Reference 1). Additionally, several studies have demonstrated the lack of mobility of PCB's by water and their affinity to bind to sediments and soils (see References 6, 7, and 8). Consequently, the potential for PCB ground-water contamination is considered low. DOHS in the February 1988 comments has suggested that the groundwater investigation to include investigation for common solvents which may have been used at the facility by previous operation. Limited investigation in this area is necessary (see Appendix B for details).

4.1.3 Surface-Water Investigation

An attempt to collect surface-water samples will be conducted immediately following rainfall which generates surface runoff. Composite samples will be collected from low points on the site and a third sample will be collected at the drain which leads to the city storm drainage system. Samples in the building will be collected in such a manner that surface water from several locations within the building are collected. The samples will be composited for initial analysis. Individual samples will be retained for further analyses if required.

4.1.4 Air Contamination Investigation

Bechtel previously subcontracted Daniel P. Boyd to evaluate risks due to airborne contamination of dioxin and furan isomers (Reference 3). Additionally, Med-Tox performed air monitoring on workers for contamination of PCBs in air for Endura Metals (Reference 2). Both investigations concluded that there is no risk of contamination exposure due to air quality; although, PCB recontamination of the floors of the building has occured since the time of the Med-Tox investigation. The Boyd investigation was completed after floor recontamination. Air monitoring will be conducted during remedial activities on a routine basis as part of the health and safety program. The use of particulate measurements as a method of evaluating potential air contamination levels will be evaluated for this program.

4.2 TASK 2: TECHNOLOGY REVIEW AND EVALUATION

In order to properly interpret and evaluate investigation data and the feasibility of various remedial alternatives, a review of existing state-of-the-art technology will be performed. The fate and transport of PCBs in soils depend on complex phenomena including adsorption (sorption) of PCBs to soils and sediments, and deep percolation of water. In the case of PCBs, the rate and amount of deep percolation, soil characteristics and PCB adsorption, in particular, are the key factors influencing PCB migration and (References 6, 7, and 8) these factors will be reviewed.

Physical properties (e.g. permeability, porosity) of the building and appurtenances will be examined and some materials will be tested for PCB contamination. PCB migration potentials, and remedial alternatives (e.g. cleaning, sealing) will be examined in evaluating appropriate remedial solutions.

4.3 TASK 3: CONTAMINATION ASSESSMENT

Existing data and data collected in the field investigations will be analyzed to define the extent of contamination in the various potential source areas, such as the railroad right-of-way, buildings and appurtenances and to assess the contaminant migration potential. The data analysis process consists of interpreting field and laboratory data, evaluating the extent of contamination and assessing the potential for movement of the contaminants throughout the area and off-site.

The evaluation of the extent of contamination and the potential for migration will address the following topics:

- o Reviewing and summarizing regulatory requirements at the federal, state, and local level.
- o Determining the vertical and lateral distribution of PCBs in the soil.
- o Mapping contaminant concentrations.
- o Evaluating the potential for contaminant migration off-site via various migration pathways.
- o Identifying potential contaminant receptors.

Based on the findings of this contamination assessment, remedial actions and alternatives can be identified and evaluated.

4.4 TASK 4: PREPARATION OF REMEDIAL INVESTIGATION REPORTS

Upon completion of each phase of field work, a report will be prepared. The report will summarize all data collected during that phase. Data interpretation will be included in the reports to the extent that it is needed to determine the need for additional work. If a report concludes that additional field work is required, the report will include a sampling plan describing the work to be done.

Upon completion of site characterization Tasks 1 through 3 and all necessary field work, a remedial investigation report will be prepared which summarizes all of the data collected on site contamination and interpretations of the data. The overall objective of the report will be to assess the nature and extent of site contamination and the contaminant migration as a prelude to identification and evaluation of remedial alternatives during the feasibility study.

Section 5

FEASIBILITY STUDY

The objective of a Feasibility Study is to select a cost effective remedial action for the abatement of site contamination problems. The Feasibility Study for the G.E. Stanford Avenue site will be conducted in accordance with EPA "Guidance on Feasibility Studies under CERCLA" (Reference 4). The study will consist of six work tasks:

Task 1: Upgrade General Response Actions

Task 2: Identify and Screen Remedial Technologies

Task 3: Formulate and Screen Remedial Alternatives

Task 4: Perform Detailed Analysis of Alternatives

Task 5: Prepare Feasibility Study Reports

As shown in Figure 5-1, a Feasibility Study begins with upgrading general response actions identified in the early stages of a Remedial Investigation. These general response actions address specific problems and contaminant pathways. A site problem may have one or more response actions, or a response action may address one or more site problems. The next step is to select feasible technologies for each of the selected response actions.

The selected technologies are then combined to form various remedial alternatives, each addressing overall site problems. The remedial alternatives are finally screened and subjected to detailed analysis to select the most cost-efficient remedial action alternative.

5.1 TASK 1: UPGRADING GENERAL RESPONSE ACTIONS

The object of this task is to develop site-specific response actions. Developing and screening remedial alternatives is an iterative process that takes place at several points in the RI/FS process. The process begin early in the remedial investigation by identifying general response actions based on

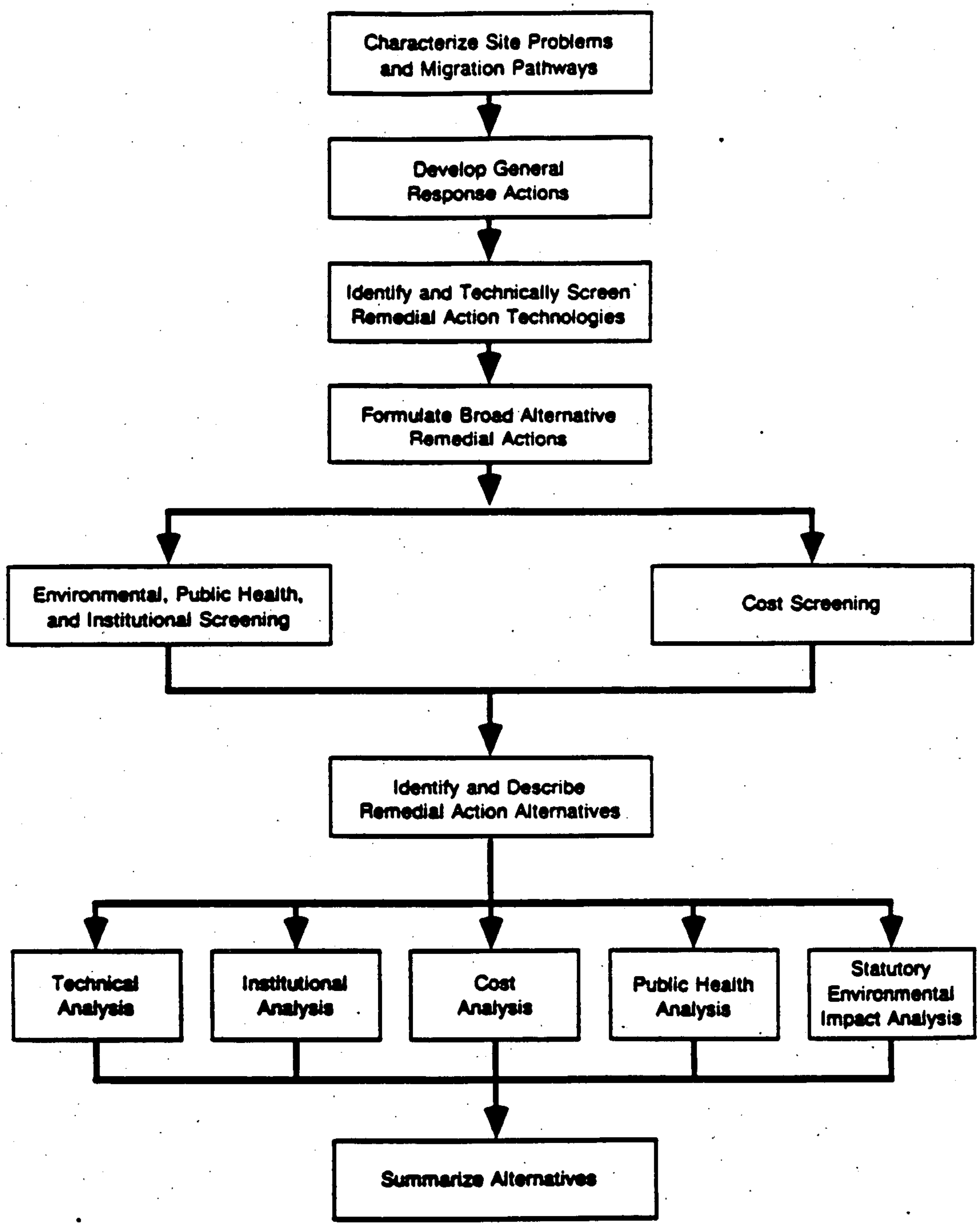


Figure 5-1 Approach to Development of Remedial Action Alternatives

preliminary data. (Refer to subsection 3.5 for general response actions which have already been developed on the basis of existing data.) As more data are collected, existing alternatives (response actions, technologies, and remedial alternatives) are rescreened or modified.

In this task, general response actions will be identified for specific problems and contaminant pathways. Site problems and corresponding general response actions which may be considered in this task include:

Known Site Problems	General Response Actions
Contaminated Soils	Total excavation Limited excavation In-situ treatment On-site treatment Containment
Contaminated Buildings and Appurtenances	Total Demolition Partial Demolition Containment Encapsulation Decontamination
Potential Site Problems	**General Response Actions**
Contaminated Ground Water	In-situ treatment Pump out/treatment
Contaminated Runoff	Surface-water controls
Airborne Contamination	Air pollution controls

5.2 TASK 2: IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

The objective of this task is to select technologies to be used to formulate remedial alternatives. For each of the general response actions developed in Task 1, feasible technologies will be identified from EPA "Guidance on Feasibility Studies under CERCLA" (Reference 4) and the EPA "Handbook for Remedial Action at Waste Disposal Sites (Revised)" (Reference 5). These technologies will then be screened based on their applicability to specific site conditions. Technologies will also be screened based on level of development, performance records, construction problems, operation and maintenance problems, and reliability. Some of the general response actions and corresponding technologies to be considered in this task are listed below:

General Response Actions	Technologies
Excavation	Limited excavation/total excavation
In-situ treatment	Oxidation, solvent washing, chemical destruction, fixation, in-situ vitrification
Direct waste treatment	Incineration, ultraviolet destruction, solidification
Ground-water control	Capping, barrier, pumping
Surface-water control	Capping, diversion, grading, revegetation
Air pollution control	Capping, dust control, source removal

At the conclusion of this task, a report will be prepared describing remedial action objectives and potentially applicable remedial action technologies. A draft will be issued to appropriate agencies for review and comment. A final version incorporating agency comments will then be issued.

5.3 TASK 3: FORMULATION AND SCREENING OF REMEDIAL ALTERNATIVES

The objective of this task is to develop workable numbers of remedial alternatives which will be subjected to detailed analysis. These alternatives will represent options that adequately address site problems and which are suited for implementation at the site. Each alternative will consist of an individual technology or a combination of technologies that have passed the screening described in Task 2 (Subsection 5.2). The alternatives to be developed will include:

- o Alternatives involving off-site treatment or disposal
- o Alternatives which attain applicable or relevant public health or environmental standards

- Alternatives which exceed applicable or relevant public health or environmental standards
- Alternatives which do not attain applicable or relevant public health or environmental standards but which meet CERCLA objectives
- A no-action alternative

At least one alternative for each of the above categories will be included in the alternative list.

After alternatives have been developed, they will be screened to eliminate those alternatives that do not adequately protect the environment and/or public health or that have costs an order of magnitude greater than the other alternatives without providing substantially greater benefits.

At the conclusion of this task, a remedial alternative screening report will be prepared. A draft will be submitted to appropriate agencies for review and comment.

5.4 TASK 4: DETAILED ANALYSIS OF ALTERNATIVES

The objective of this task is to conduct detailed analysis of the alternatives screened in Task 3 (Subsection 5.3). The detailed analysis will allow selection of a cost effective alternative. The selected alternative should be technically feasible and reliable and should effectively mitigate and minimize damage to and provide adequate protection of public health and the environment. The work elements in this task are:

- Conceptual design of alternatives
- Technical analysis
- Institutional analysis
- Cost analysis
- Public health analysis
- Analysis of beneficial environmental impacts

5.4.1 Conceptual Design of Alternatives

In order to evaluate the alternatives, especially on the basis of technical and cost considerations, site specific conceptual level designs must be prepared for each alternative showing sufficient detail to estimate capital and operation and maintenance (O&M) costs.

5.4.2 Technical Analysis

The remedial alternatives developed in Task 3 (Subsection 5.3) will be ranked. The technical criteria include:

- Performance
- Reliability
- Implementability
- Time requirements for implementation and benefits
- Safety

The alternatives will be ranked in order of their desirability with respect to each of the above criterion and a recommendation of appropriate alternatives will be made.

5.4.3 Institutional Analysis

Institutional analysis requires evaluation and consideration of applicable or relevant and appropriate federal, California and local requirements, criteria, advisories and guidances in the selection, design and scheduling of the remedial alternatives. Standards and requirements which will be reviewed for their applicability to the GE Stanford site include:

Federal Standards and Requirements

- Comprehensive Environmental Response, Compensation and Liability Act, Section 105 (3)
- Toxic Substance Control Act
- National Contingency Plan, 40 CFR Part 300, Subpart F

- Resource Conservation and Recovery Act
- 40 CFR, Part 261, 761
- 29 CFR, Part 1910.120
- Clean Water Act
- Clean Air Act
- National Ambient Air Quality Standards
- DOT Hazardous Material Transport Rules
- National Interim Primary Drinking Water Standards
- EPA "Draft Quality Objectives Development Guidance for Uncontrolled Hazardous Waste Site Remedial Response Activities"

State and Local Standards and Requirements

- California Hazardous Waste Control Act
- California Administrative Code Title 22, Division 4, Chapter 30

Recommended remedial alternatives are generally those that achieve relevant standards. However, under certain circumstances, an alternative that does not comply fully with applicable or relevant standards may be selected. Reasons for such selection may be that:

- The selected alternative is not the final remedial action and will ultimately be incorporated into a more comprehensive remedial action program.
- All of the alternatives which meet applicable standards are technically impractical or have unacceptable impacts on the environment or cost.

Remedial alternatives are also subject to all applicable or relevant public health standards. However, it is GE's position that the alternative selected will pose a minimum threat for public exposure during remedial activities. GE will notify residents adjacent to the site prior to remedial activities. Applicable warning signs will be posted around the site and 24 hour site security will be provided during remedial activities when personnel are on site. Activities will be monitored to verify that all conditions that are described below in Section 5.4.5 are met.

5.4.4 Cost Analysis

Cost analysis involves comparing the costs of remedial alternatives. Comparisons of cost measures will include:

- o Capital, and operation and maintenance costs
- o Present worth analysis
- o Sensitivity analysis for key parameters

Measures of cost will be based on the conceptual designs prepared for each of the remedial alternatives. Vendor estimates for similar projects and various costing guides will be used as sources of cost information. Capital and O&M cost estimates and present worth analyses will be presented in tabular form.

Capital costs will include direct and indirect capital costs. Direct capital costs will include construction, equipment, land and site development, building, relocation, and disposal costs, while indirect construction costs will include engineering costs, license and/or permit costs, startup costs and contingency allowances.

Operation and maintenance costs will include operating labor, maintenance materials and labor costs, service costs, insurance and tax costs, administration costs, contingency funds, and rehabilitation costs.

5.4.5 Public Health Analysis

The objective of public health analysis will be to assess the effects of the alternatives on public health. Public health analysis will draw largely on the information collected in exposure assessment. The degree to which each of the remedial alternatives minimizes or eliminates public exposure to site contamination will be evaluated. Reductions in public exposure as a result of various alternatives will be compared with applicable or relevant public health standards. A summary of the public health evaluation of the alternatives will be presented in tabular form.

5.5 TASK 5: PREPARATION OF FEASIBILITY STUDY REPORTS

Upon completion of Tasks 1 through 5, a feasibility study report summarizing the results of each work task will be prepared. The report will contain the following major sections:

- Executive Summary
- Introduction
- Screening of Remedial Action Technologies
- Remedial Action Alternatives
- Analysis of Remedial Action Alternatives
- Summary of Remedial Alternatives

The introduction to the report will include a summary of the findings presented in both the Remedial Investigation and Endangerment Assessment reports. The remaining sections will summarize the work performed under Tasks 1 through 5 of the Feasibility Study.

Two drafts and a final report will be issued. The first draft will be submitted to the appropriate state agencies for review. Comments will be incorporated into the second draft which will be issued for public comment. Following public review, a final report will be issued.

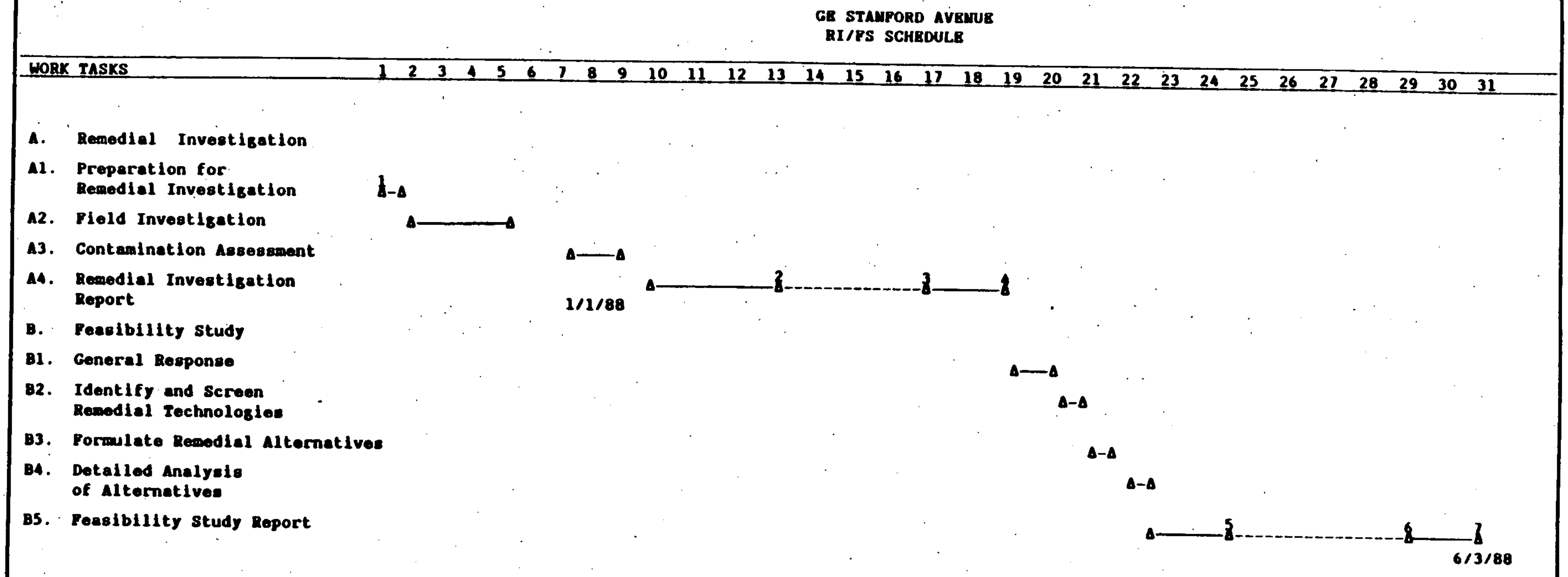
Section 6

SCHEDULE AND DELIVERABLES

To accomplish the objectives of the RI/FS in accordance with EPA guidelines, two principal work tasks have been identified:

- o Site Characterization
- o Feasibility Study

A breakdown of these tasks and a schedule for their completion is presented in Figure 6-1. The field investigation (Task A1) will begin after DOHS approval of the work plan. The schedule for Task A includes field investigations. The duration of the Task B can only be roughly estimated at this time.



MILESTONES

1. Work Plan Approval
2. Draft Remedial Investigation Report
3. Receipt of DOHS Comments on Draft Remedial Report
4. Final Remedial Investigation Report
5. Draft Feasibility Study Report
6. Receipt of DOHS Comments on Draft Feasibility Study Report
7. Final Feasibility Study Report

Figure 6.1

REFERENCES

1. Brown and Caldwell, Summary Report of Results of Verification Sampling to Confirm PCB Removal; Stanford Avenue Correction Project. September 21, 1984

2. Med Tox, Occupational and Environmental Survey at Endura Mental Products, May 1985

3. Daniel P. Boyd and Company, Evaluation of Commercial Buildings for the Presence of Polyaromatic Compounds April 17, 1987

4. U. S. Environmental Protection Agency, June 1985. Guidance on Feasibility Studies under CERCLA, EPA 540/G-85/003.

5. U. S. Environmental Protection Agency, June 1985. Guidance on Remedial Investigations under CERCLA, EPA 540-G-85/002

6. U. S. Environmental Protection Agency, May 1980. Attenuation of Water Soluble Polychlorinated Biphenyls by Earth Materials, EPA 600/2-80-027

7. U. S. Environmental Protection agency, January 1976. Study of the Distribution and Fate of Polychlorinated Biphenyls and Benzenes after Spill of Transformer Fluid, EPA 68-01-3232

8. U. S. Environmental Protection Agency, 1983. Environmental Transport and Transformation of Polychlorinated Biphenyls, EPA 560/5-83-025

APPENDIX A

SUMMARY OF DATA

FOR THE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT THE

GE STANFORD AVENUE FACILITY

RR:6045r kml:Rev.1

APPENDIX A-1

BROWN & CALDWELL

February 1984

0100c

DISCUSSION OF BROWN AND CALDWELL REPORT (1984)

In 1984 Brown and Caldwell performed a limited investigation and supervised a site cleanup at the G.E. Stanford Avenue facility. Presented in this Appendix are two figures and one table generated by Brown and Caldwell as a result of those activities. The first figure is a site plan. Of particular significance is the shaded area along the railroad area (East Area Strip). The following figure is an enlargement of the East Area Strip.

The East Area Strip figure shows depths of excavation performed by the Brown and Caldwell contractor. The excavation depths were based on soil sample analytical results for PCB's. At the time, limits of excavation were reached when the PCB's concentration was below 50 ppm. The deepest excavation along the East Area Strip was 9 feet.

The table presents the analytical results at various increments of excavation and confirmatory sampling. The table references the East Area Strip figure for each sample location. The depth of the excavation is denoted in the figure by graphic shade codes. For example Zone 6 showed no contamination after the fourth sampling. Upon examining the East Area Strip Plan, the graphic shade code indicates that this area was excavated to nine feet.

According to the East Area Strip Plan and the sample results table, no PCB contamination exists lower than nine feet which is the lowest excavation level.

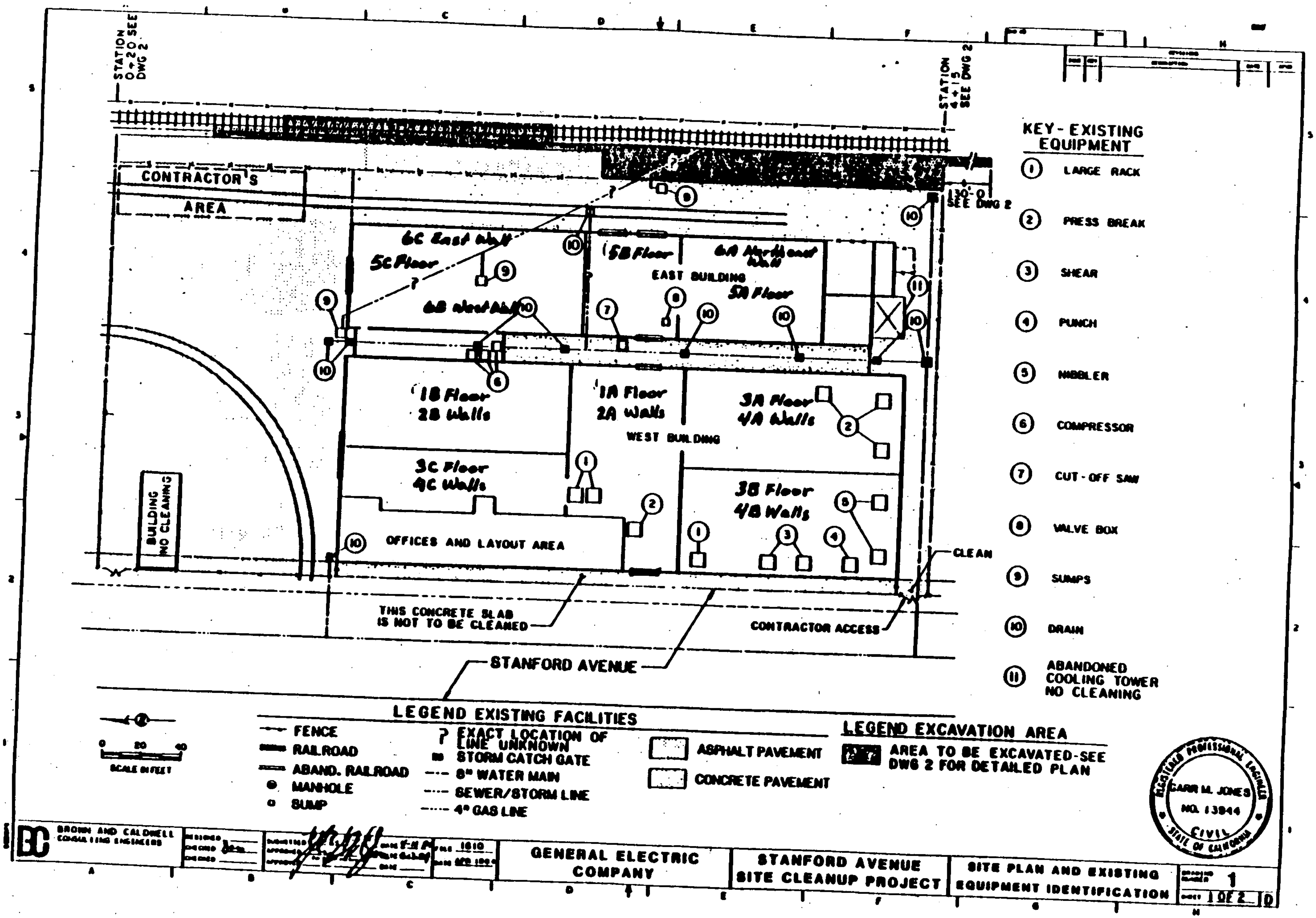


Figure 1 Sector References for Building Sampling

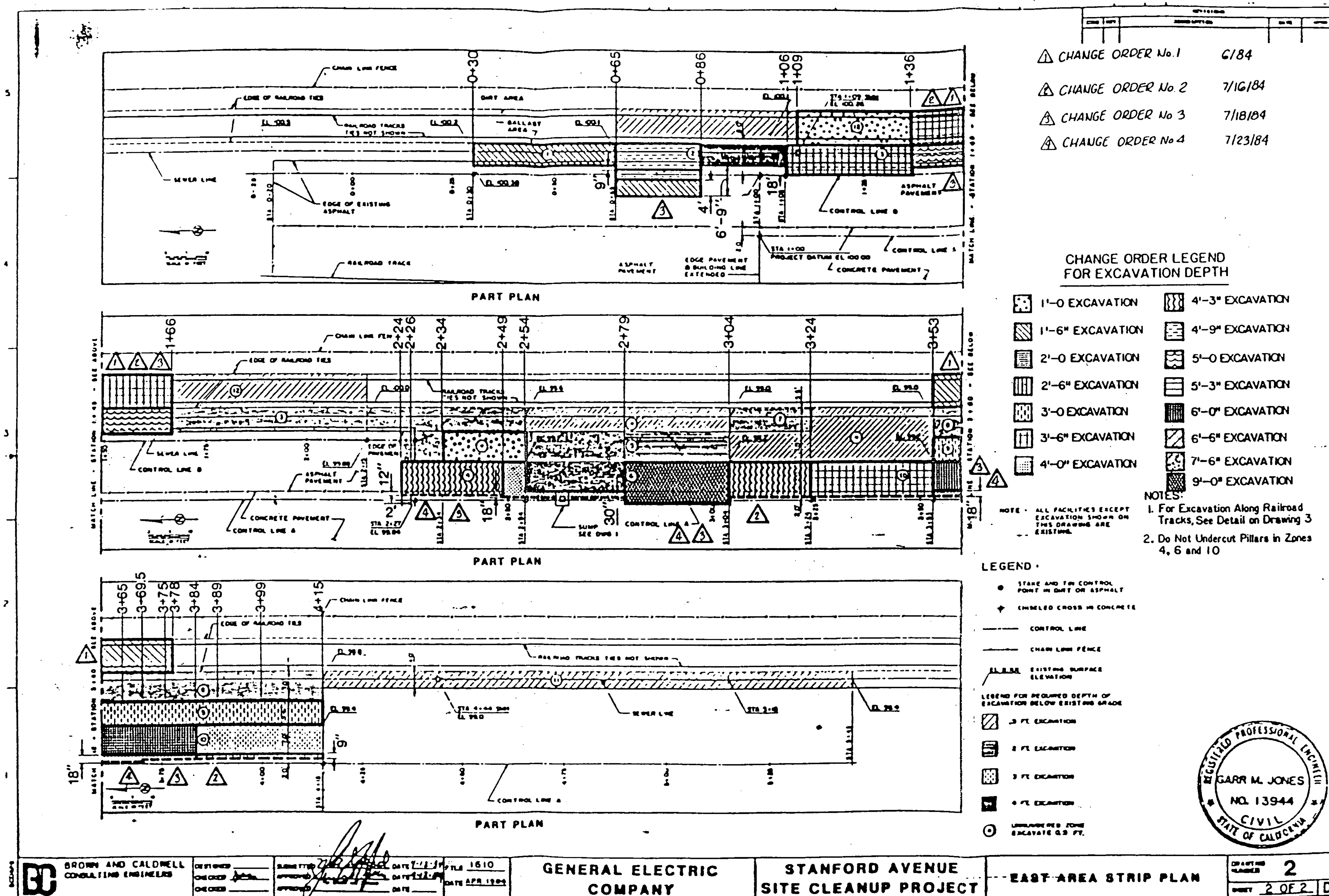

CHANGE ORDER No. 1 6/84
CHANGE ORDER No. 2 7/16/84
CHANGE ORDER No 3 7/18/84
CHANGE ORDER No 4 7/23/84
CHANGE ORDER LEGEND FOR EXCAVATION DEPTH
1'-0 EXCAVATION
1'-6" EXCAVATION
2'-0 EXCAVATION
2'-6" EXCAVATION
3'-0 EXCAVATION
3'-6" EXCAVATION
4'-0" EXCAVATION
4'-3" EXCAVATION
4'-9" EXCAVATION
5'-0 EXCAVATION
5'-3" EXCAVATION
6'-0" EXCAVATION
6'-6" EXCAVATION
7'-6" EXCAVATION
9'-0" EXCAVATION
NOTES:
1. For Excavation Along Railroad Tracks, See Detail on Drawing 3
2. Do Not Undercut Pillars in Zones 4, 6 and 10
LEGEND
PART PLAN
PART PLAN
PART PLAN
GARR M. JONES
NO. 13944
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
BROWN AND CALDWELL CONSULTING ENGINEERS
GENERAL ELECTRIC COMPANY
STANFORD AVENUE SITE CLEANUP PROJECT
EAST AREA STRIP PLAN
2
2 OF 2
D
APR 1984
1610

Table 1 Results of Sampling to Verify Removal of PCB's by Soil Excavation

Zone	Sample reference[a]	7/3 to 10/84 First sampling[b]	7/16/84 Second sampling[b]	7/19/84 Third sampling[b]	7/23/84 Fourth sampling[b]	7/27/84 Fifth sampling[b]
1	1a (B)	>500	ND-(P)	-	-	-
2	1b (B)	170	ND-(P)	-	-	-
	1c (B)	ND-(P)	-	-	-	-
	2a (S)	200	>1,000	<50-(P)	-	-
	2b (S)	ND-(P)	-	-	-	-
3	2c (S)	>2,000	ND-(P)	-	-	-
	3a (B)	>1,500	ND-(P)	-	-	-
	3b (B)	>2,000	>1,000	<50-(P)	-	-
	3c (B)	ND-(P)	-	-	-	-
	7a (S)	ND-(P)	-	-	-	-
	7b (S)	ND-(P)	-	-	-	-
4	4a (B)	12-(P)	-	-	-	-
	4b (B)	72	ND-(P)	-	-	-
	4c (B)	1,300	>500	62	<50-(P)	-
	4d (S)	>2,000	>150	<50-(P)	-	-
5	5a (B)	<6.3-(P)	-	-	-	-
	5b (B)	10-(P)	-	-	-	-
6	6a (B)	<50-(P)	-	-	-	-
	6b (B)	1,600	>500	140	<50-(P)	-
	6c (B)	>50-75	ND-(P)	-	-	-
	7c (S)	>2,000	ND-(P)	-	-	-
	9a (S)	>4,000	ND-(P)	-	-	-
7	5c (B)	3.6-(P)	-	-	-	-
8	8b (B)	<50-(P)	-	-	-	-
	8c (B)	<50-(P)	-	-	-	-
9	8a (B)	>2,000	>2,000	<50-(P)	-	-
10	9b (S)	>2,000	ND-(P)	-	-	-
	9c (S)	>200	ND-(P)	-	-	-
	10a (B)	>200	ND-(P)	-	-	-
	10b (B)	>1,000	>500	180	>2,000c	<50-(P)
	10c (B)	<50-(P)	-	-	-	-
11	11a (B)	11 composite				
	11b (B)	13-(P)	-	-	-	-
	11c (B)					
12	12b (B)	>1,000	ND-(P)	-	-	-
	12c (B)	ND-(P)	-	-	-	-
12A	12a (B)	100	ND-(P)	-	-	-
13	13 (B)	1.6-(P)	-	-	-	-

[a]Sample references followed by (B) are bottom samples; those followed by (S) are sidewall samples.

[b]All values are in mg/kg of total PCB. Sample values followed by (P) indicate area was verified as passing the less than 50 mg/kg criterion established by regulatory agencies for decontamination of soils.

[c]Because of this increased sample value, special sampling of area 10b was done on 7/25/84 to better determine the location and depth of PCB in soils. For this work, 10b was subdivided into 4 quadrants A to D from north to south. Samples from each quadrant were taken at depth intervals of 0 to 3 inches and 6 to 12 inches. All were less than 50 mg/kg and did not reveal the source of high PCB.

APPENDIX A-2

BECHTEL NATIONAL, INC.

January - March 1985 Sampling

<u>January 1985</u>

Figure 1	Sample Locations
Table I	Preliminary Results
Table II	Laboratory Results Split of Samples

<u>February - March 1985</u>

Figure 1	Sample Locations
Figure 2	Contaminated Samples in Previously Cleaned Areas
Table 1	Sample Coordinates
Table 2	Summary of Analysis Results

DISCUSSION OF BECHTEL NATIONAL, INC.
JANUARY - MARCH 1985 SAMPLING RESULTS

In January - March 1985 BNI sampled the Stanford Avenue facility in a preliminary effort to characterize re-contamination of previously cleaned areas.

Figure 1 of the Appendix shows the locations of composite sampling on the site plan. Tables I and II summarizes the analytical results from the composite sample locations presented in Figure 1, for the preliminary sampling in January 1985.

Figure 2 of the Appendix shows the locations of soil boring along the railroad right of way and one roof sample. Table 1 identifies the sample location coordinates for sample locations identified in Figure 2. Table 2 presents the summary of analytical results for PCB analysis performed on the samples collected February - March 1985.

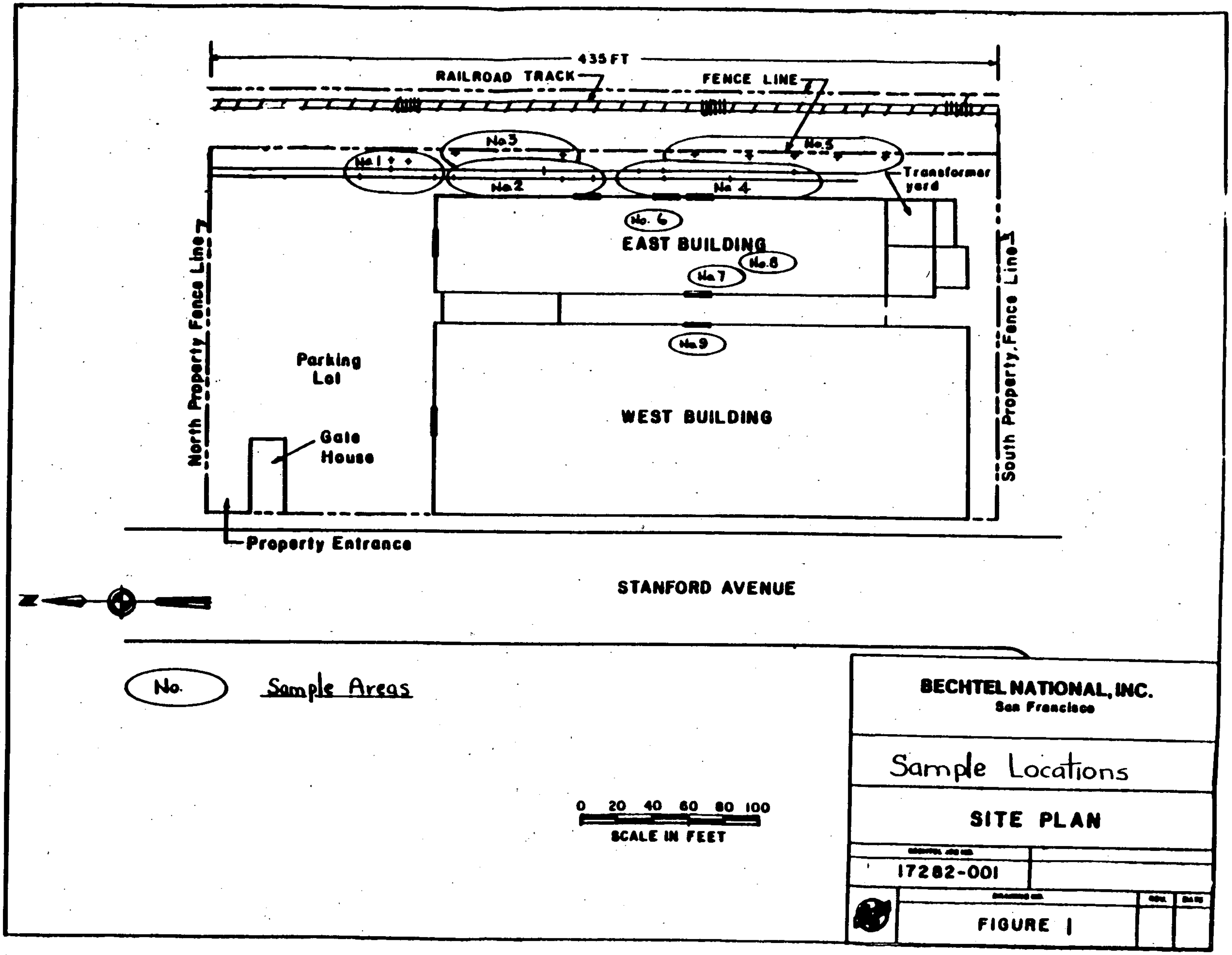

435 FT
RAILROAD TRACK
FENCE LINE
No.1
No.2
No.3
No.4
No.5
No.6
No.7
No.8
No.9
Transformer yard
EAST BUILDING
WEST BUILDING
Parking Lot
Gate House
North Property Fence Line
South Property Fence Line
Property Entrance
STANFORD AVENUE
N
No. Sample Areas
0 20 40 60 80 100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
Sample Locations
SITE PLAN
17282-001
FIGURE 1

TABLE I
SAMPLES FROM STANFORD AVENUE
Preliminary Results
1/22/85

SAMPLING

Sample No.	Location*	Type	Comment	PCB Level, PPM
#1	Asphalt and Rail Area	Sand & Soil	Composite of 5 Samples	210
#2	Rails, North End of Concrete	Sand & Soil	Composite of 4 Samples	320
#3	Fence Line, North End of Concrete	Sand & Soil	Composite of 2 samples	1800
#4	Rails, South End	Soil	Composite of 5 samples	280**
#5	Fence Line, South End of Concrete	Soil	Composite of 5 Samples	140
#6	Back Building, Floor	Silt	1 Sample, Approx. 16 ft.^{2} Swept	330
#7	Back Building, Floor	Silt	1 Sample, Approx. 100 ft.^{2} Swept	1200
#8	Back Building, Floor	Silt	1 Sample, Approx. 100 ft.^{2} Swept	1500
#9	Front Building, Floor	Silt	1 Sample, Approx. 100 ft.^{2} Swept	620
#10	Collected Wash Water,			0.1 mg/Liter

*See Attached Site Plan
**original contamination 734 ppm (one sample, unverified) LACHD

1547F

TABLE II
LABORATORY ANALYSIS RESULTS
SPLIT OF SAMPLES
ENDURA METAL PRODUCTS

Sample No.	Location*	Type	Comment	PCB Levels (PPM) Brown and Caldwell Laboratory	PCB Levels (PPM) General Electric Laboratory
#1	Asphalt and Rail Area	Sand & Soil	Composite of 5 Samples	210	170
#2	Rails, North End of Concrete	Sand & Soil	Composite of 4 Samples	320	400
#3	Fence Line, North End of Concrete	Sand & Soil	Composite of 2 samples	1800	3300
#4	Rails, South End	Soil	Composite of 5 samples	280	360
#5	Fence Line, South End of Concrete	Soil	Composite of 5 Samples	140	57
#6	Back Building, Floor	Silt	1 Sample, Approx. 16 $ft.^2$ Swept	330	460
#7	Back Building, Floor	Silt	1 Sample, Approx. 100 $ft.^2$ Swept	1200	1000
#8	Back Building, Floor	Silt	1 Sample, Approx. 100 $ft.^2$ Swept	1500	1300
#9	Front Building, Floor	Silt	1 Sample, Approx. 100 $ft.^2$ Swept	620	540

*Samples taken and split January 22, 1985

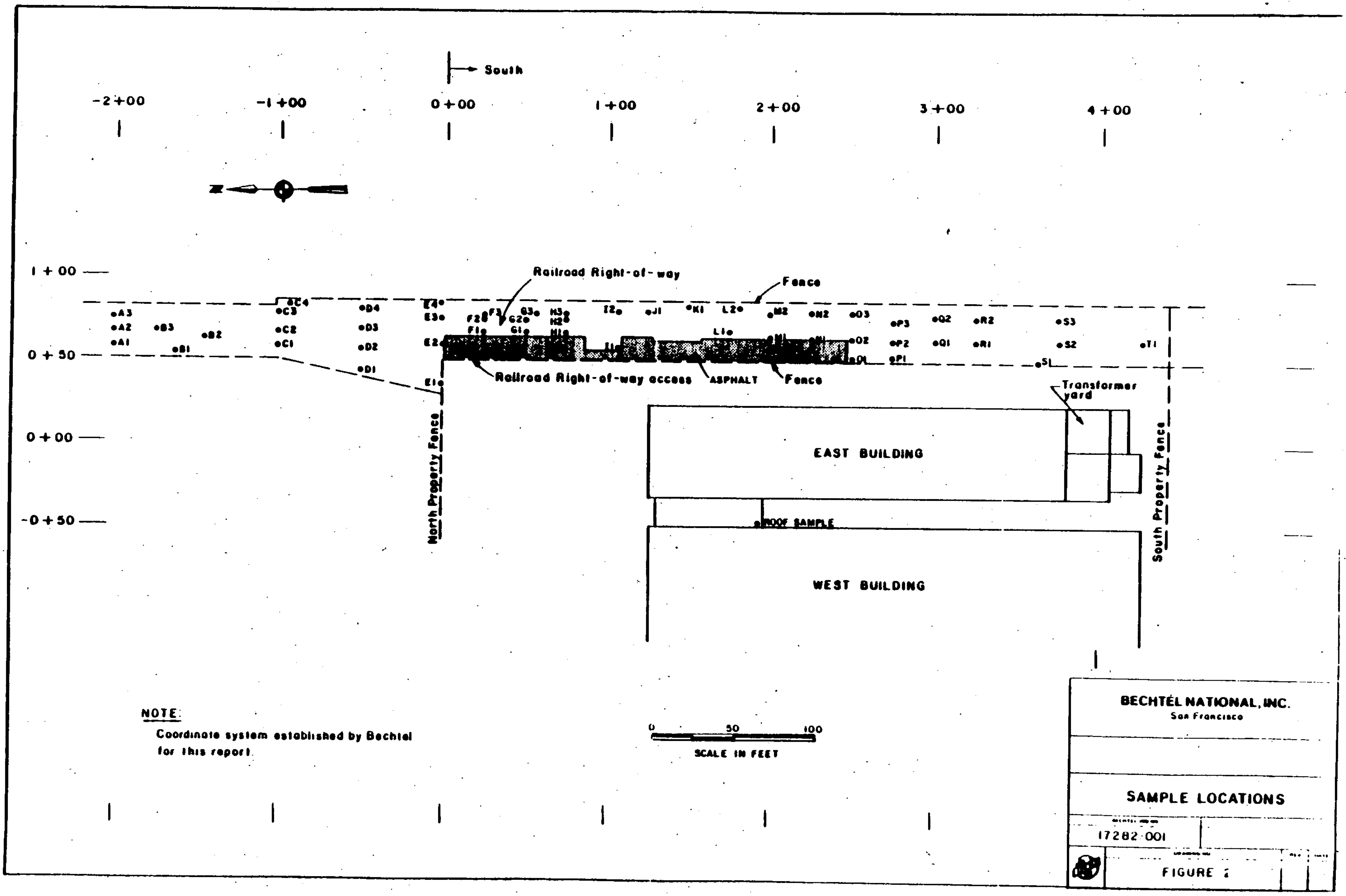

South
-2+00
-1+00
0+00
1+00
2+00
3+00
4+00
1+00
0+50
0+00
-0+50
Railroad Right-of-way
Fence
Railroad Right-of-way access
ASPHALT
Fence
Transformer yard
North Property Fence
South Property Fence
EAST BUILDING
ROOF SAMPLE
WEST BUILDING
NOTE:
Coordinate system established by Bechtel for this report.
0
50
100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
SAMPLE LOCATIONS
17282-001
FIGURE 2

TABLE 1

Sample Locations*

Sample #	Coordinates	
	South	East
A1	-2+00	0+58
A2	-2+00	0+66
A3	-2+00	0+74
B1	-1+63	0+54
B2	-1+44	0+61
B3	-1+74	0+66
C1	-1+00	0+58
C2	-1+00	0+66
C3	-1+00	0+77
C4	0+93	0+82
D1	-0+50	0+43
D2	-0+50	0+56
D3	-0+50	0+69
D4	-0+50	0+80
E1	0+00	0+35
E2	0+00	0+58
E3	0+00	0+74
E4	0+00	0+84
F1	0+25	0+66
F2	0+25	0+74
F3	0+25	0+77

TABLE 1 (Continued)

Sample Locations*

Sample #	Coordinates	
	South	East
G1	0+50	0+66
G2	0+50	0+74
G3	0+56	0+77
H1	0+75	0+66
H2	0+75	0+74
H3	0+75	0+77
I1	1+07	0+58
I2	1+07	0+80
J1	1+25	0+80
K1	1+50	0+82
L1	1+75	0+68
L2	1+81	0+82
M1	2+00	0+64
M2	2+00	0+79
N1	2+25	0+64
N2	2+25	0+79
O1	2+50	0+52
O2	2+50	0+64
O3	2+50	0+79

TABLE 1 (Continued)

Sample Locations*

Sample #	Coordinates	
	South	East
P1	2+75	0+52
P2	2+75	0+63
P3	2+75	0+74
Q1	3+00	0+63
Q2	3+00	0+77
R1	3+25	0+63
R2	3+25	0+77
S1	3+63	0+50.5
S2	3+75	0+63
S3	3+75	0+77
T1	4+25	0+63
Roof	1+95	-0+45

*Refer to figure 2

TABLE 2

SUMMARY OF ANALYSIS RESULTS

SAMPLE #	AROCLOR 1260*	AROCLOR 1242**	TOTAL PCB
A1	.6	-	.6
A2	-	-	-
A-3	-	-	-
B1	16	-	16
B2	2.5	-	2.5
B3	-	-	-
C1	3	-	3
C2	.6	-	.6
C3	1.6	-	1.6
C4	.5	-	.5
D1	52	-	52
D2	310	-	310
D3	4	-	4
D4	1.8	-	1.8
E1	110	-	110
E2	13	-	13
E3	32	-	32
E4	12	-	12
F1	290	-	290
F2	20	-	20
F3	7.5	-	7.5
G1	1100	-	1100
G2	120	-	120
G3	10	-	10
H1	810	10	820
H2	38	-	38
H3	28	29	57
I1	120	43	160
I2	27	21	48
J1	29	-	29

*For locations of samples containing Aroclor 1260 only see Figure 4

**For locations See Figure 3

TABLE 2 (Continued)

SUMMARY OF ANALYSIS RESULTS

SAMPLE #	AROCLOR 1260*	AROCLOR 1242**	TOTAL PCB
K1	4.6	2.9	7.5
L1	150	2300	2500
L2	14	6.5	21
M1	63	47	110
M2	3.3	-	3.3
N1	320	43	360
N2	250	80	330
O1	9.2	-	9.2
O2	3.8	-	3.8
O3	5.7	-	5.7
P1	3	-	3
P2	1.8	-	1.8
P3	3.9	-	3.9
Q1	2.3	-	2.3
Q2	3.5	-	3.5
R1	-	-	-
R2	4.2	-	4.2
S1	11	-	11
S2	1.5	-	1.5
S3***	3300	1900	5200
T1	22	4.4	26
Roof	5	-	5

*For locations of samples containing Aroclor 1260 only see Figure 4

**For locations See Figure 3

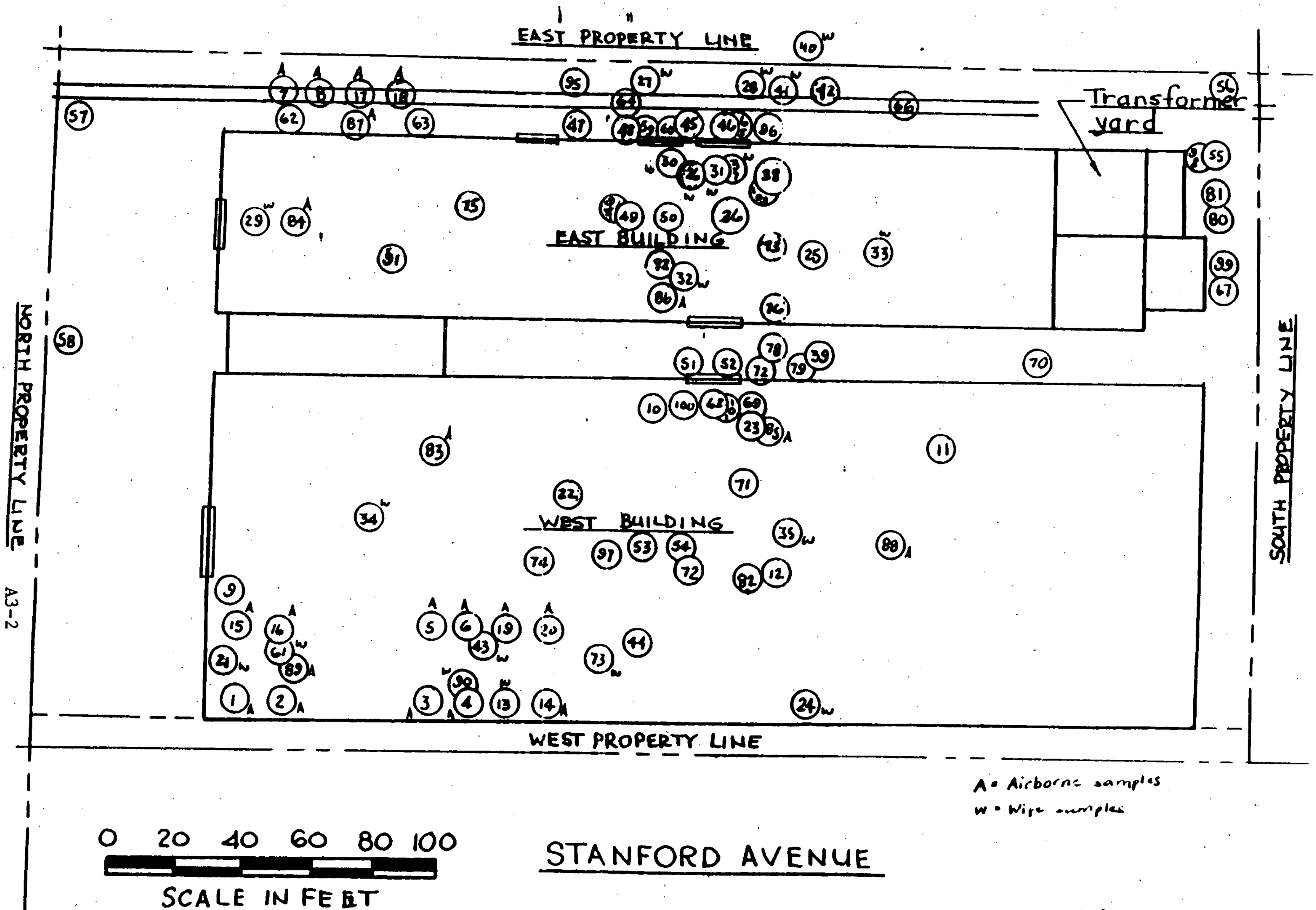
***Sample Verified at 3700 (1260) and 2400 (1242)

APPENDIX A-3

Med-Tox DATA

February - March 1985 Sampling

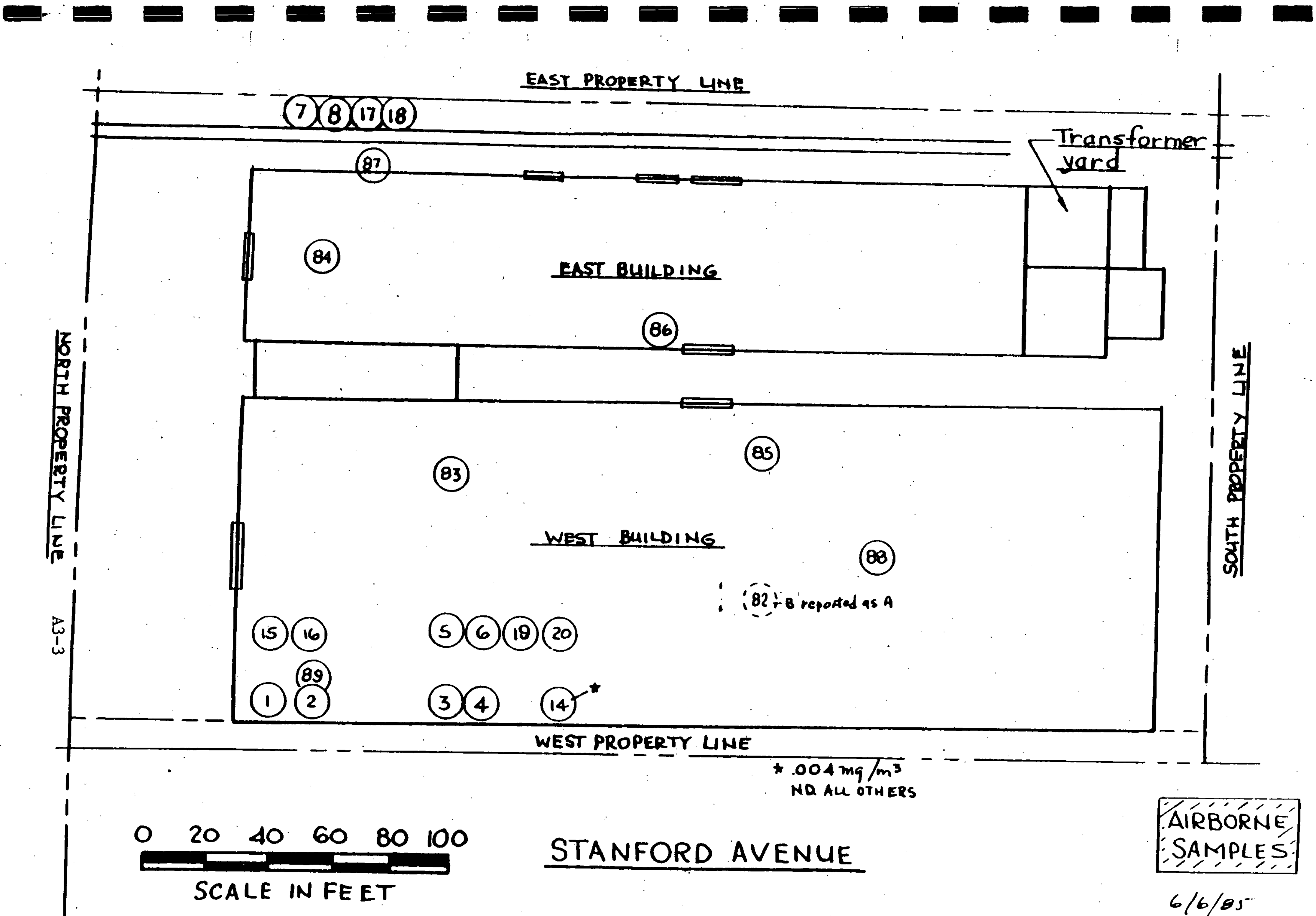
0100c



MED-TOX DATA

BECHTEL

Figure 1 SAMPLE LOCATIONS



BECHTEL

MED-TOX DATA DISTRIBUTION

Table 1

Results from Sample Collection at Endura Facility

A = Airborne Sample (units are expressed in milligrams/cubic meter)
W = Wipe Sample (units are expressed in total micrograms [g])
Area collected is 100 centimeters squared unless otherwise specifi
B = Bulk Sample (units are expressed in parts per million [ppm]
C = Core sample collected from using hand auger
(expressed same as "B")
BD = Bulk sample collected from drilling (expressed same as "B")
N.D. = None Detected
* = Analysis for 2,3,7,8-tetrachloro di-benzodioxin (TCDD)

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(1)	A	7-20-84	CE0720-1A	SE corner of Menchen's Office	N.D.
(2)	A	7-20-84	CE0720-1B	Same as above	N.D.
(3)	A	7-20-84	CE0720-2A	Top of bookcase of receptionist	N.D.
(4)	A	7-20-84	CE0720-2B	Same as above	N.D.
(5)	A	7-20-84	CE0720-3A	Louver above drafting room door	N.D.
(6)	A	7-20-84	CE0720-3B	Same as above	N.D.
(7)	A	7-20-84	CE0720-4A	Dock by railroad tracks	N.D.
(8)	A	7-20-84	CE0720-4B	Same as above	N.D.
(9)	B	7-24-84	CE0724-B	Floor	486 ppm, * N.D.
(10)	B	7-24-84	CE0724-D	Wood from sump wall	447 ppm, * N.D.
(11)	B	7-24-84	CE0724-E	Crack in floor	2,620 ppm, * N.D.
(12)	B	7-24-84	CE0724-G	Residue from floor.	170 ppm, * N.D.

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(13)	W	7-24-84	CE0724-WD	Roof by AC unit #2	65 ug. * N.D.
(14)	A	7-25-84	CE0725-1A	Top of Reception-ist's bookcase	.004 mg/m * N.D.
(15)	A	7-25-84	CE0725-2A	SE Corner of Bob Menchen's Office	N.D.
(16)	A	7-25-84	CE0725-2B	Same as above	N.D.
(17)	A	7-25-84	CE0725-3A	Center of loading dock by railroad track	N.D.
(18)	A	7-25-84	CE0725-3B	Same as above	N.D.
(19)	A	7-25-84	CE0725-4A	Louver above draft-ing room door	N.D.
(20)	A	7-25-84	CE0725-4B	Same as above	N.D.
(21)	W	9-4-84	CE0904-A	Front building concrete floor	897 µg
(22)	B	9-4-84	CE0904-E	Front bldg. from cracks in the concrete	879 ppm
(23)	B	9-4-84	CE0904-F	Front bldg. from cracks in the concrete	402 ppm
(24)	W	9-4-84	CE0904-I	Front bldg. off concrete floor	125 µg
(25)	W	9-4-84	CE0904-L	Back bldg. off concrete floor	427 µg
(26)	W	9-4-84	CE0904-M	Back bldg. off concrete floor	4,100 µg

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(27)	W	1-4-85	SP104-A	Behind back bldg. next to fence	5.32 µg
(28)	W	1-4-85	SP104-B	Behind back bldg. next to old sump	18.1 µg
(29)	W	1-4-85	SP104-C	Back bldg. off the concrete floor near north exit	5.32 µg
(30)	W	1-4-85	SP104-D	Back bldg. off the concrete floor next to far north double door	23.9 µg
(31)	W	1-4-85	SP104-E	Back bldg. off the concrete floor next to far east double door	16.9 µg
(32)	W	1-4-85	SP104-F	Back bldg. off the concrete floor in center of bldg.	22.5 µg
(33)	W	1-4-85	SP104-G	Back bldg. off the concrete floor in south section (center)	9.82 µg
(34)	W	1-4-85	SP104-H	Front bldg. off the concrete floor in north section of bldg.	18.4 µg
(35)	W	1-4-85	SP104-I	Front bldg. off the concrete floor in south section of bldg.	8.33 µg
(36)	B	1-15-85	SP0115-EA	Back bldg. under grate; in front of west exit door	9,580 ppm
(37)	W	1-15-85	SP0115-EB	Back bldg. adjacent to cracks in floor; center of bldg.	51.1 µg

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	Pcb CONCENTRATION
(38)	B	1-15-85	SP0115-EC	Back bldg. in cracks in floor; center of bldg.	2,070 ppm
(39)	B	1-15-85	SP0115-ED	Area between front and back building; under grate	485 ppm
(40)	W	1-15-85	SP0115-EE	Railroad tracks closest to sump behind back building.	41.0 μg
(41)	W	1-15-85	SP0115-EF	Behind back building on cracks next to sump.	52.9 μg
(42)	B	1-15-85	SP0115-EG	Behind back building in cracks next to sump.	571 ppm
(43)	W	1-15-85	SP0115-EI	Front building adjacent to cracks on floor.	40.8 μg
(44)	B	1-15-85	SP0115-EJ	Front building from cracks.	332 ppm
(45)	C	2-07-85	SP0207-A1	0"-1/2" below surface collected in area between fence and railroad tracks; adjacent to old covered up sump	980 ppm

(NOTE: Ineffectiveness of wipe samples versus bulk samples on floor)

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(46)	C	2-07-85	SP0207-A2	1/2"-1" below surface collected in area between fence and rail-road tracks; adjacent to old covered up sump	850 ppm
(47)	C	2-07-85	SP0207-B1	0"-1/2" below sur-face collected in area between fence and back building	4080 ppm
(48)	C	2-07-85	SP0207-B2	1/2"-1" below sur-face collected in area between fence and back building	560 ppm
(49)	C	2-07-85	SP0207-C1	0"-1/2" below sur-face collected in back building; approx. center of building	129 ppm
(50)	C	2-07-85	SP0207-C2	1/2"-1" below sur-face collected in back building; approx. center of building	29 ppm
(51)	C	2-07-85	SP0207-D1	0"-1/2 below face collected between front and back buildings; above underground piping	387 ppm
(52)	C	2-07-85	SP0207-D2	1/2"- 1" below surface collected between front and back buildings; above underground piping	219 ppm

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(53)	C	2-07-85	SP0207-E1	0"-1/2" below surface collected in front building; center section in cracks.	105 ppm
(54)	C	2-07-85	SP0207-E2	1/2"-1" below surface collected in front building; center section in cracks.	99 ppm
(55)	B	2-27-85	SP0227-A	South boundry of Endura property; between back building and fence	150 ppm
(56)	B	2-27-85	SP0227-B	SE corner of Endura property; at the storm drain	17 ppm
(57)	B	2-27-85	SP0227-C	NE corner of property; next to fence.	130 ppm
(58)	B	2-27-85	SP0227-D	North boundry; between back and front bldgs.	50 ppm
(59)	B	2-28-85	DT0228-A	Behind back bldg. just north of double doors in water drain; approx. 1" below surface	55 ppm
(60)	B	2-28-85	DT0228-B	Behind back bldg. just north of double doors in water drain; approx. 10" below surface	400 ppm

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(61)	W	03/06/85	SP0306-A	Black particulate material from roof above offices	19 µg
(62)	B	03/06/85	SP0306-B	Dirt off of concrete, between back building and tracks	100 ppm
(63)	B	03/06/85	SP0306-C	"New" dirt from railroad track grooves	170 ppm
(64)	B	03/06/85	SP0306-D	Oily dirt from railroad track grooves	5 ppm
(65)	B	03/06/85	SP0306-E	"New" dirt collected between double doors of back bldg. and railroad tracks	55 ppm
(66)	B	03/06/85	SP0306-F	Dirt collected from grooves in railroad tracks - south end of building	30 ppm
(67)	B	03/06/85	SP0306-G	Oily substance from underground tank on south end of property	< 2.0 ppm
(68)	B	03/06/85	SP0306-H	Topsoil collected from beneath grate from middle of east wall; front building	1600 ppm

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(69)	B	03/06/85	SP0306-I	Same place as SP0306-H but 4" below top-soil surface	28 ppm
(70)	B	03/06/85	SP0306-J	Dirt collected from beneath grate; located outside between front and back buildings; south end	260 ppm
(71)	B	03/06/85	SP0306-K	Dirt (swept up) off concrete floor; front building near center	340 ppm
(72)	B	03/06/85	SP0306-L	Dirt (swept up) off concrete floor; front building approx. at center	310 ppm
(73)	W	03/06/85	SP0306-M	Wipe sample collected off wheel of forklift located in front building	76 µg
(74)	B	03/06/85	SP0306-N	Dirt collected in cracks off floor; front building approx. 25' north from center of building	350 ppm

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	CONCENTRATION 1242 (ppm)	1260
(75)	B	03/15/85	SP0315-B	Fresh Soil, "hew" collected on West side of northern most double door in back of Building	N.D.	500
(76)	B	03/15/85	SP0315-C	Top soil collected beneath grate located next to the west center door of back building.	900	15,000
(77)	B	03/15/85	SP0315-D	Sludge collected between front and back buildings - south of center	N.D.	0.80
(78)	B	03/15/85	SP0315-E	Sludge collected from grate between front and back buildings	26	41
(79)	B	03/15/85	SP0315-F	Dirt collect off concrete surface between front and back buildings	ND	84
(80)	B	03/15/85	SP0315-G	Silt collected from underground tank #3 from east boundry	ND	ND
(81)	B	03/15/85	SP0315-H	Dirt collected from last tank grate (2nd series) from East boundry	ND	5,000

NOTE: Dioxin sample results pending - SP0315-A.

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(82) B	A ?	03/20/85	DKB0320-A	Bulk dust from transformer like pit at west center of front building.	350 ppm
(83)	A	03/20/85	DKB0320-1	Personal air sample - Art Bashaw - Welder/Sheet Metal Worker	ND
(84)	A	03/20/85	DKB0320-2	Air sample of James Acosta - Forklift Driver	ND
(85)	A	03/20/85	DKB0320-3	Area air sample taken at East Entrance of Front Building	ND
(86)	A	03/20/85	DKB0320-4	Air sample taken at the West-Central area of the Rear Building	ND
(87)	A	03/20/85	DKB0320-5	Air sample taken outside near railroad track behind back building	ND
(88)	A	03/20/85	DKB0320-6	Air sample taken in the center of the front building	ND
(89)	A	03/20/85	DKB0320-7	Personal air sample of Charlie Ashimine - Welder	ND
(90)	B ? (Wipe)	04/3/85	DKB0403-B	Sample of carpet at south office entrance	5.5 µg

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(91)	B	04/03/85	DKB0403-1A	Dust sweeping from floor of building floor	1,400 ppm
(92)	B	04/03/85	DKB0403-2A	Dust sample from crack in floor - back building	3,200 ppm
(93)	B	04/03/85	DKB0403-3A	Sample from floor scupper or drain - Middle section southend of back building	500 ppm
(94)	B	04/03/85	DKB0403-4A	Small pipe boring in floor between doors in back building	9,900 ppm
(95)	B	04/03/85	DKB0403-5A	Sludge from drain cover between rail-of track - East of back building	170 ppm
(96)	B	04/03/85	DKB0403-6A	Sweepings of fine sand/dust outside - East of back building by railroad tracks.	230 ppm
(97)	B	04/03/85	DKB0403-7A	Sweepings of dust from floor of front building.	320 ppm
(98)	B	04/15/85	MT0415-A	Fluid sample taken from tanks at south-east end of building closest to railroad track	6.0 ppm

MAP LOCATIONS	TYPE	DATE	SAMPLE #	LOCATION	PCB CONCENTRATION
(99)	B	04/15/85	MT0415-B	Fluid sample taken from tanks at south-east end of back building. See map for sample location.	ND
(100)	C	04/15/85	MT0415-C	Soil sample taken from valve box found at east end of front building.	4.4 ppm
(101)	C	04/15/85	MT0415-C1	Same as MT0415- C only 6-12 inches deeper.	4.6 ppm
(102)	C	04/15/85	MT0418-D	Soil sample taken from valve box at floor - East end back building.	ND
(103)	C	04/15/85	MT0418-D1	Same as MT0415- D only 6-12 inches deeper.	ND <1

PCB Wipe Samples:

Wipe samples collected had concentrations ranging from 5 micrograms to over 4,000 total micrograms per wipe. A more detailed account of the concentrations are listed below:

LOCATION	HIGHEST CONCENTRATION (total ug)
Office roof area	65.0
Front building; concrete floor	897.0
Front building; cracks	40.8
Back building; concrete floor	4,100.0
Back building; cracks	51.0
East side of back building	53.0
Railroad track area	41.0
Forklift wheel; front building	76.0

ug/wipe

PCB Bulk Samples:

The majority of samples collected were bulk samples or Type B (as expressed in the result section). The following chart gives a representation of the general area sampled as well as the concentrations present.

LOCATION	HIGHEST CONCENTRATION (ppm)
Front building; 1 foot square area	340.0
Front building	2,620.0
Front building; cracks	879.0
Back building	9,900.0
Back building	3,200.0
West exit grate; back building	15,000.0
Area between buildings	485.0
SE corner of facility	150.0
NE corner of facility	130.0
Sump area	571.0
Beneath lid of underground tank	1,600.0

PCB Core Samples:

Core samples of surface cement were analyzed for PCBs and the concentrations representing the first 1/2" of material are provided below.

LOCATION	HIGHEST CONCENTRATION (ppm)
Sump area	980.0
Concrete east of back building	4,080.0
Back building	129.0
Area between front and back buildings	387.0
Front building	105.0

2,3,7,8-TCDD
Analysis performed by Science Applications

Location	Concentration
Front Building (see Appendix A)	None Detected

?
not stand behind Med Tox data

Table 2

LOCATION OF SAMPLES

SP0515-1	East (back) building, ceiling - repeat of positive sample
SP0515-2	East (back) building, ceiling - above easternmost double doors
SP0515-3	East (back) building, floor - general area
SP0515-4	East (back) building, floor - crack or grate area
SP0515-5	West (front) building, ceiling - Les Menchen's office
SP0515-6	West (front) building, floor - general area
SP0515-7	West (front) building, floor - crack or grate area
SP0515-8	Rear of east (back) building, sump area
SP0515-9	Rear of east (back) building, asphalt area - NE corner near railroad tracks
SP0515-10	East (back) of building, product "cardboard" sample
SP0515-11	West (front) building, product "wipe sample"
SP0515-12	East (back) building - clean wood sample from ceiling
SP0515-13	Control; clean soil sample from outside of building upstream of contamination

Additional control samples:

a) Performance sample

b) Laboratory blank

Table 3

PCDD/PCDF:
Analysis performed by Brehm Laboratory

Location	Type	Concentration/ppb
Back Building Ceiling Area		
	2,3,7,8-TCDD	0.498
	total tetra dioxin	30.1
	total penta dioxin	93.6
	total hexa dioxin	75.6
	total hepta dioxin	69.6
	total octa dioxin	11.6
	2,3,7,8-TCDF	24.3
	total tetra furan	102.0
	total penta furan	166.0
	total hexa furan	67.1
	total hepta furan	62.2
	total octa furan	20.9

total PCDD = 281.0

PCDF = 442.5

Bmount conc.

APPENDIX A-4

DANIEL P. BOYD

March 1986 Sampling

This section presents a summary of information and conclusions extracted from the Danial P. Boyd and company report dated January 1987. This discussion represents pertinent conclusions with respect to exposure and relative toxicities of existing airborne dioxins and furans. The extract will begin with the summary followed by the method utilized and end with the discussion of observations and comparison of relative toxicity issues.

EXECUTIVE SUMMARY

Site samples indicate that the airborne contamination found in the air of the buildings was at levels below the currently accepted concentrations of PCB's and PCDD's used in assessing the habitability of buildings in California and show no excess concentration above ambient background levels. No apparent excess risk would be presented to building users as a result of the measured amounts of PCBs, PCDFs and PCDDs detected during the week of this survey.

METHOD

Air samples were collected by use of line operated sampling pumps for both the PCB samples and for the PCDD/PCDF samples. Airborne PCBs were collected on dual stage Florisil tubes in accordance with the procedure developed by the National Institutes for Occupational Safety and Heath (NIOSH). A measured volume of air is drawn through a small sorbent tube containing Florisil which adsorbs the PCB present in the air sample. The collected PCB are desorbed in hexane and the resulting solutions are analyzed using gas chromatography with electron capture detection. The concentration of PCB relative to a PCB standard (Aroclor) is read from a standard curve. Air flow rates were measured during the sampling period by use of a precision rotameter, calibrated against a primary standard bubble meter. Flow calibration data was collected throughout the sampling period for all air samples to obtain a time history of flow, since it is known that these flows can vary significantly over extended periods of time. Air volume for the samples were based upon the actual flow rates as recorded throughout the survey.

Each PCDD/PCDF sample was started by fabrication and assembling the sampling head at Battelle Columbus Laboratories (BCL) in Ohio. This assembly included the cleaning and spiking, silica absorbent as described in the BCL methods. An identical sampling head unit was supplied by BCL for pre-survey calibration of the pumps and sampling train. In the field each sampling head was assigned a field sample number using a date code to describe its initial use.

The configuration of the sampling train allowed simultaneous collection of the PCB samples at each of the pump stations used for the PCDD/PCDF sample.

DISCUSSION OF OBSERVATIONS

The PCB air samples indicate that at all sites monitored the airborne concentrations were below 0.15 ug/M^3. This concentration is approximately 10-fold lower than the NIOSH recommended limit of 1.0 ug/M^3 and approximately 500-fold lower than the California Occupational Safety and Health Administration (CalOSHA) limit of 500 ug/M^3.

Evaluation of the PCDD/PCDFs in the air samples produced no observable levels of dioxin congeners above that found in the ambient outdoor air. No tetra- or penta- chlorinated dioxin were found in the samples. The airborne concentrations of PCDFs given in the Table 4-6 show that a variety of congeners of PCDFs are present.

The analysis data report only the different amounts of the individual chemical groups, but do not give any relationship to their toxic risk potential. A method has been developed to deal with this questions of the varying toxicity of the chemical homologs. The process involves relating the chemical concentrations of materials with uncertain toxicity (because of a paucity of data from animal testing) to the toxicity of 2,3,7,8-TCDD, the method of "2,3,7,8-TCDD Equivalents". This latter compound is chosen because it is the most studied compound of the entire series of PCDD/PCDF isomers.

Recent policy decisions in the State of California* have been related to the authors of this report. According to Dr. Stephens, ideally DOH would prefer to see 2,3,7,8 TCDD equivalents based on isomeric analysis of all 15 furan and dioxin isomers containing chlorination at the 2,3,7,8 positions. The concentration of each of the 15 isomers would then be multiplied by a preestablished toxicity equivalent factor (TEF) and the entire set of 15 summed to reach "total 2,3,7,8 TCDD equivalents". In this process, DOH assumes similar furan and dioxin homologs have equal TEFs. Specifically, tetra and penta dioxins and furans with the 2,3,7,8 configuration are considered to have a TEF of 1.0 while hexa and hepta furans and dioxins with the 2,3,7,8 configuration are considered to have a TEF of 0.03. Mono, di, tri and octa furans and dioxins are not considered.

If isomeric analysis is not available, Dr. Stephens suggested a fall-back position wherein the concentration of each homolog would be multiplied by a fraction which represents the theoretical percentage of isomers in that homolog containing the 2,3,7,8 configuration. The toxicity equivalent factor would then be applied to each homolog and summed to calculate a 2,3,7,8 TCDD equivalent. For example, one of the 38 tetra TCDFs contain the 2,3,7,8 configuration, thus, the concentration of tetra furans measured in the air would be multiplied by 0.026 (1/38) and multiplied again by the toxicity equivalent factor (1.0). Similar calculations would be made for the remaining tetra, penta, hexa, and hepta homologs. The resulting series of numbers would be summed to reach a final 2,3,7,8 TCDD equivalent.

By utilizing California DOH's latest approach, the TCDD equivalents for

---

* Phone communication with Dr. Bob Stephens, California DOHS, January 15, 1987

indoor air can be calculated by suing UMEA data as follows:

mono	furans	x	0	=	0		=	0
di	furans	x	0	=	0		=	0
tri	furans	x	0	=	0		=	0
tetra	furans	x	1.0	=	(.28)	(1.0)	=	.280
penta	furans	x	1.0	=	(.2975)	(1.0)	=	.298
hexa	furans	x	0.03	=	(.065)	(.03)	=	.002
hepta	furans	x	0.03	=	(.0458)	(.03)	=	.001
octa	furans	x	0	=	0		=	0
mono	dioxins	x	0	=	0		=	0
di	dioxins	x	0	=	0		=	0
tri	dioxins	x	0	=	0		=	0
tetra	dioxins	x	1.0	=	(.025)	(1.0)	=	.025
penta	dioxins	x	1.0	=	(0.45)	(1.0)	=	.045
hexa	dioxins	x	0.03	=	(.01)	(.03)	=	.001
hepta	dioxins	x	0.03	=	(.01)	(.03)	=	.001
octa	dioxins	x	0	=	0		=	0
					TEF		=	0.653

From this calculation the TCDD equivalents, resulting from the California DOH recent policy decision, is .653, a value 2.7 times less than that calculated under the California 1983 assumptions, even though the double worst case assumptions were used in the later analysis.

6209F

TABLE 4-1

PCDD/PCDF Sampler Identification Numbers

BCL ID #	DPB Head #	NCC Field Sample #	Pump #	Analysis Lab*/#
41194-76-21	DPB-1	60303-1NJ	1	BCL/not provided
41194-76-22	DPB-2	60303-2NJ	2	UMEA/MPR 538:1
41194-76-23	DPB-3	60303-3NJ	3	UMEA/MPR 538:2
41194-76-24	DPB-4	60303-4NJ	4	BCL/not provided
41194-76-25	DPB-5	60303-5NJ	5	UMEA/MPR 538:3
41194-76-10	DPB-11	NCC Calibration Unit		Not Analyzed
41194-76-27	DPB-6	60306-2DB	3	C-DOH/not reported
41194-76-28	DPB-7	60306-3DB	1	C-DOH/not reported
41194-76-29	DPB-8	60305-1DB	2	UMEA/MPR 538:4
41194-76-30	DPB-9	60305-2DB	5	UMEA/MPR 538:5
41194-76-31	DPB-10	60306-1DB	4	UMEA/MPR 538:6

* BCL - Battelle Columbus Laboratories; Dr. DeRoos
UMEA - University of Umea, Sweden; Dr. Rappe
C-DOH - California Dept. of Health Services; Dr. Stevens

TABLE 4-2

PCDD/PCDF Air Sampling Data

NCC #	Rotometer Value	Flow Rate	Sample Time	Air Volume
60303-1NJ	4.124	14.1 lpm	4255 min.	60.00 M^3
60303-2NJ	6.289	23.8	2802	66.69
60303-3NJ	4.670	16.0	3868	62.27
60303-4NJ	5.060	17.6	3646	64.17
60303-5NJ	5.965	21.3	2964	63.13
60305-1DB	5.396	19.0	3205	60.90
60305-2DB	4.950	17.2	3614	62.16
60306-1DB	5.785	20.6	3281	67.59
60306-2DB	6.412	24.6	3126	76.90
60306-3DB	5.894	21.2	2829	59.97

PCB Air Sampling Data

NCC Field Sample #	Sample Time	Sample Volume	Sample Location	PCB* (ug/M^3) Concentration
60303-6NJ	1483 min	1269. liter	East building, Pump 3	< ND **
60303-7NJ	1483	1482.	East building, Pump 3	< ND **
60303-8NJ	1468	1396.	East building, Pump 4	< ND **
60303-9NJ	1468	1566.	East building, Pump 4	< ND **
60303-10NJ	0	0	Field Blank	< ND **
60303-11NJ	1320	1307.	West building, Pump 1	< ND **
60303-12NJ	1320	1267.	West building, Pump 1	< ND **
60303-13NJ	1433	1419.	West building, Pump 2	< ND **
60303-14NJ	1433	1462.	West building, Pump 2	< ND **
60303-15NJ	1427	1456.	Outdoor air, Pump 5	< ND **
60303-16NJ	1427	1313.	Outdoor air, Pump 5	< ND **

* Arochlor 1260

** ND - None Detected at Minimum Detection Limit of 0.15 ug/M^3 or laboratory analysis limit of 0.2 ug.

Date: 3 March 1986 Location: 6900 Stanford St, LA, CA

Nearest Airport: LAX Sample 60303-1NJ

3 March 86 Sample # 1

Time	Temp, DB	Temp, WB	Remark	Wind	Barometer	Initials
1312	(60%RH) 71	62	Rm=4.0	calm/breeze	29.82	[illegible]
1630	(60%RH) 68.5	60	=4.0 (g.p. 18)		29.78	[illegible]
2102	(65%RH) 66	59	=4.0	Calm	29.87	[illegible]
0058	(75%) 62	57.5	=4.1 vac=17.5	Calm	29.89	MAG
0458	(82%) 59	56	=4.1 17.5	Calm	29.83	MAG
0706	(79%) 60	56	=4.10 18	Calm	29.82	K+B
0900	(74) 64	57	4.1 17.5	calm	29.85	DLW
1105	(69%) 69	62.5	4.1 17.5	calm	29.88	[illegible]
1257	(56%) 74	63.5	4.1 18.0	calm	29.83	KEB
1503	(64%) 71	63.0	4.1 17.5	Calm	29.82	[illegible]
1654	(78.5%) 66	61	4.1 17.8	calm	29.78	MAG
1859	(76%) 63.5	59	4.1 17.5	steady lite breeze	29.75	MAG
2058	(80%) 62.5	59	4.2 17.8	steady west breeze	29.78	MAG
0101	(80%) 62	58.5	41 18	Calm	29.75	Pm
0500	(78%) 62	58	4.1 18	Calm	29.75	Pm
0721	(80%) 61.5	58	4.1 18	Calm	29.8	KEB
0923	72% 65	59.5	4.2 18	Calm/lite	29.8	KEB
1145	(83%) 71	67.5	4.2 18	calm	29.81	[illegible]
1340	(68%) 70	62.0	4.1 18	calm	29.81	[illegible]
1502	(66.5%) 68	61	4.1 18	steady lite breeze	29.80	MAG
1659	(70%) 66.5	60.5	4.2 17.5	ditto	29.76	MAG
1901	(78%) 63	59	4.2 17.5	moderate breeze	29.80	MAG
2100	(80%) 62	58.5	4.2 17.5		29.80	MAG
0058	(78%) 63	59	4.2 18	Calm	29.82	Pm
0305	(78%) 62.5	58.5	4.1 18	calm	29.80	[illegible]
0502	(76%) 63	58.5	4.1 18	Calm	29.82	Pm
0655	(78%) 62	58	4.2 18		29.83	KEB
0900	(78%) 62	58	4.2 17.5			KEB
1105	(71%) 64	58.5	4.2 17	calm	29.86	[illegible]

te: 3 March 1986 Location: 6900 Stanford St. LA, CA

Nearest Airport: LAX

Sample 60303-2NJ

Sample # 2

me	Temp, DB	Temp, WB	Remark	Wind	Barometer	Initials
18			Rm·59			[illegible]
1045			·61 (gP=15)			[illegible]
06			·61			[illegible]
0103			=6.2 vac=14.5			MAG
03			=6.2 14.5			MAG
0710			6.3 15			KEB
10			6.4 15			DLW
1109			6.4 15			[illegible]
04			6.4 14.8			KEB
1505			6.3 15.0			[illegible]
00			6.4 14.8			MAG
1700			6.3 14.8			MAG
01			6.3 14.8			MAG
04			6.4 14.5			[illegible]
0702			6.4 15			[illegible]
23			6.4 14.9			KEB
0725			6.3 14.5			KEB
6			6.4 15			[illegible]
1127			Pump off.			[illegible]

e 3 March 1986 Location: 6900 Stanford St, LA, CA

rest Airport: LAX Sample 60303-3KJ

Sample #3

an 86

	Temp, DB	Temp, WB	Remark	Wind	Barometer	Initials
2~			Rm 45			MAG
01,			.46 (gp=18)			MAG
			:46			Pm
06			=4.6 vac. = 19.0			MAG
5			-4.6 =19.0			MAG
7/4			4.6 =19.0			KEB
1			4.6 20			DLW
11			4.8 19.5			[illegible]
0			4.7 19.5			KEB
07			4.7 20.0			[illegible]
2			4.7 19.5			MAG
02			4.7 19.5			MAG
3			4.7 19.5			MAG
07			4.7 19.6			Pm
54			4.6 19.6			Pm
,4			4.7 19.5			KEB
6			4.7 19.5			KEB
2			4.7 20			MAG
3			4.7 20			[illegible]
2			4.7 19.8			MAG
04			4.7 19.8			MAG
7			4.7 19.8			MAG
05			4.7 19.8			MAG
2			4.7 20			Pm
310			4.7 20			MAG
7			4.7 19.5			Pm
518			4.7 Pump Off			MAG

Date: 3 March 1986 Location: 6900 Stanford St, LA, CA
Nearest Airport: LAX Sample 60303-4NJ

Pn and Sl. Sample #14

Time	Temp, DB	Temp, WB	Remark	Wind	Barometer	Initials
23			Rm 49			
11:50			49 (gp= 19)			
12			49			
0108			=4.9 Vac. = 19.0			MAG
16			=5.0 =19.0	#60303NJ (not connected)		MAG
0712			5.0 19.1			KEB
15			5.1 19.5			DLW
113			5.1 19			
06			5.0 19			KEB
1508			5.0 19			
04			5.0 19			MAG
08			5.1 19			MAG
05			5.0 19			MAG
09			5.1 19.5			
2:05			5.0 19			
25			5.1 19			KEB
26			5.1 19			KEB
3			51 19			
345			51 19			
13			5.1 19.2			MAG
706			5.2 20.0			MAG
08			5.2 19.8			MAG
107			5.2 19.8			MAG
04			5.2 20			
140			52 Pump Off			

e 5 March 1986 Location: 6900 Stanford Ave, LA, CA

arest Airport: LAX Sample 60305-1DB

60305-1DB

Sample #6

me	Temp, DB	Temp, WB	Remark	Wind	Barometer	Initials
[illegible]			Rn 5B ug Vac g. 22			[illegible]
42			54 21.5			[illegible]
			5.4 21.2			MAG
02			5.4 21.0			MAG
[illegible]			5.4 21.0			MAG
03			5.3 21.0			MAG
0			5.4 21.5			[illegible]
310			5.4 21.5			[illegible]
5			5.4 21.5			[illegible]
59			5.4 21.5			KEB
3			5.4 21.5			KEB
06			5.4 21.5			[illegible]
[illegible]			5.4 22.0			[illegible]
[illegible]			5.4 21.2			[illegible]
7-4			5.4 21.2			MAG
0			5.4 21.2			MAG
104			5.4 21.2			MAG
15			5.4 21.3			[illegible]
2504			5.4 21.2			[illegible]
00			5.4 21.3			KEB
900			5.4 21.5			KEB
13			5.4 21.5			[illegible]
257			5.4 21.5			[illegible]
102			5.4 21.2			MAG
657			5.5 21.2			MAG

e: 5 March 1986 Location: 6900 Stanford Ave, L.A, CA

rest Airport: LAX 60305-2DB

14 March 1986 Sample #7

e	Temp, DB	Temp, WB	Remark		Wind	Barometer	Initials	
Q5			Start Sample, Run 48				MAG	
1c	(72%) 66	60.5		Vac @ 18			MAG	
—	—	—	4.9	17.5	—	—	—	
07	(86%) 62	58.5	4.9	17.5			MAG	
c	(88%) 59	57	4.9	17.5			MAG	
09	(88%) 59	57	4.9	17.5			MAG	
:	(91%) 59	57.5	5.0	17.5			[illegible]	
15	(88%) 59	57	5.0	18		29.80	MAG	
13	(88%) 59	57	5.0	17.5		29.80	[illegible]	
14	85% 60	57.5	5.0	18.0	calm	~~[illegible]~~	KEB	
17	85% 60	57.5	5.0	18.0	calm		KEB	
10	78% 62	58	5.1	17.5	0-2 K5		MAG	
4	(73.5) 64	59	5.0	17.5			[illegible]	
07	(69.5%) 65	59	4.9	17.5			[illegible]	
78	(80%) 65	58	4.9	17.5			MAG	
07	(80%) 65	58	4.8	17.0			MAG	
09	(82%) 60	57	4.9	17.2			MAG	
	(86%) 60	57.5	4.9	17.2	calm	29.75	[illegible]	
	(82%) 60	57	4.9	17.0	calm.	29.75	[illegible]	
7	(88%) 59	57	5.0	17.0	calm ART	29.75	KEB	PART OF RAIN COVER
4	(88%) 60.5	57.5	5.0	17.1	calm cw	29.78	KEB	
8	(83%) 60.5	57.5	5.0	17.0	calm cloudy		[illegible]	
04	(83%) 61.5	58.5	5.0	17.5	calm cloudy		[illegible]	
56	(73%) 63	58	4.95	16.5	ditto		MAG	
52	(73%) 63	58	5.0	17.0	ditto		[illegible]	
5	(82%) 60	57	4.9	16.3	"		MAG	
05	(82%) 60	57	5.0	16.5	"		MAG	
2	(82%) 60	57	5.0	16.5	"		DLW	
7	(82%) 60	57	5.0	16.5	"		DLW	
36	(94%) 58	57	5.0	16.5	mist		DLW	OFF

:te: 6 March 1986 Location: 6900 Stanford Ave LA, CA

Nearest Airport: LAX Sample 60306-1DB

Sample # 8

Time	Temp, DB	Temp, WB	Remark		Wind	Barometer	Initials
.42	(RH 78%) 69	59	RM-52	19	Calm	29.85	PM
12			5.9	.20			MAG
09			5.8	19			PM
0713			5.9	19			KEB
06			5.8	19			KEB
1109			5.8	19.5			MAG
1303			5.8	19.0			[illegible]
1504			5.8	19.3			[illegible]
707			5.8	19.2			MAG
1903			5.8	19.2			MAG
108			5.8	19.2			MAG
0110			5.8	19.2			PM
0308			5.8	19.0			PM
0705			5.8	19.0			KEB
0902			5.8	19.0			KEB
107			5.8	18.8			[illegible]
1302			5.8	19.0			[illegible]
505			5.8	19.0			MAG
1650			5.8	21.0	probably read incorrectly MAG		[illegible]
1904			5.8	19.0			MAG
2103			5.8	18.5			MAG
2310			5.8	19			DLW
0115			5.8	19			DLW
1320			5.8	19			DLW
0514			5.8.	18.5			DLW
0705			5.8	18.8			[illegible]
.823	Off		5.8	18.8			[illegible]

Date: 6 March 1986 Location: Enduro Kiwi..., LA CA

Nearest Airport: LAX 60306 - 2 DB

Sample # 9

Time	Temp, DB	Temp, WB	Remark		Wind	Barometer	Initials
0522			Rm=5.4	Vm.p.=17			MAG
0710			6.4	17.5	(Damp #9 SE Wall East Bld)		KEB
905			6.5	17.5			KEB
1108			6.5	17.2			MAG
[illegible]			6.4	17.5			[illegible]
150[illegible]			6.5	17.2			[illegible]
706			6.5	17.2			MAG
1902			6.5	17.2			MAG
106			6.4	17.2			MAG
0108			6.5	17.5			Pm
1507			6.5	17.0			Pm
0703			6.5	17.1			KEB
0901			6.5	17.1			KEB
1105			6.4	17.2			[illegible]
1300			6.5	17.1			[illegible]
504			6.5	17.0			MAG
1649			6.5	17.0			[illegible]
901			6.4	17.0			MAG
2101			6.4	17.0			MAG
309			6.4	17			DLW
0113			6.5	17			DLW
1325			6.4	17			DLW
0512			6.4	17			DLW
702			6.4	17.3			[illegible]
0903			6.4	17.2			[illegible]
[illegible]	[illegible]		6.4	17.2			[illegible]

Date: 3/6/86 Location: Eudara [illegible]

Nearest Airport: LAX 60306-3DB

Sample #10

Time	Temp, DB	Temp, WB	Remark		Wind	Barometer	Initials
39			Ra 5.8	vac g. 15			[illegible]
1259	(Rh-74%) 66	60	5.8	15.5	calm	29.89	[illegible]
1500	(74%) 66	60	5.9	15.3			[illegible]
1701	(74%) 64	59	5.9	14.8	lite breeze	29.80	MAG
1859	(75%) 63	58.5	5.9	14.8	calm	29.78	MAG
2101	(73%) 63	58	5.9	15.0	lite breeze	29.78	MAG
2303	(78%) 62	58	5.9	15.5	Calm	29.75	Pm
0502	(78%) 62	58	5.9	15.5	Calm	29.75	Pm
0655	(78%) 62	58	5.9	15.5	Calm	29.75	KEB
0855	(78%) 62	58	5.9	15.5	Calm	29.78	KEB
1101	(75%) 63	58.5	5.9	15.0		29.75	[illegible]
1258	(73%) 63	58	5.9	15.5		29.75	[illegible]
1458	(71%) 64	58.5	5.9	14.8	lite breeze	29.72	MAG
1648	(71%) 64	58.5	5.9	15.0		29.70	[illegible]
1858	(77%) 62	58	5.95	14.8	lite breeze	29.72	MAG
2058	(78%) 61.5	57.5	5.9	14.8	ditto	29.75	MAG
2205	(73) 63	5?	5.9	14.8	"	29.75	DLW
0107	(73%) 63	58	5.9	14.8	"	29.75	DLW
0239	94% 58	57	(outside)	—	Mist	29.70	DLW
0328	88% 61	59	5.9	14.8	Mist	29.70	DLW
0506	94% 60	59	5.9	14.8	Rain	29.65	DLW
0706	(87%) 61	58.5	5.9	15.0	rain	29.66	[illegible]
0900	(88.5%) 62	60	5.9	15.2	rain	29.69	[illegible]
1048	(96%) 61	60	5.9	15.2	rain	29.70	[illegible]

* 0143 wet bulb thermometer broken. Readings after 0143 taken with one thermometer wet then dry DLW

TABLE 4-3

PCB Wipe Sampling Results

NCC Field Sample #	Sample Type	Surface Concentration *	Sample Location
60306-1NJ	Floor	600. ug/M^2	East building/N-end
60306-2NJ	Floor	840.	East building/N-center
60306-3NJ	Floor	6000.	East building/Center
60306-4NJ	Floor	4000.	East building/E-center
60306-5NJ	Floor	5200.	East building/W-center
60306-6NJ	Floor	6400.	East building/S-center
60306-7NJ	Floor	2440.	East building/S-end
60306-8NJ	Floor	1320.	West building/N-end
60306-9NJ	Floor	1120.	West building/N-center
60306-10NJ	Floor	840.	West building/E-center
60306-11NJ	Floor	1560.	West building/W-center
60306-12NJ	Floor	304.	West building/S-end
60306-13NJ	Wall	ND **	East building/N-end of east wall
60306-14NJ	Wall	ND	East building/N-side of east doors
60306-15NJ	Wall	ND	East building/S-side of east doors
60306-16NJ	Wall	ND	West building/N-wall east of door
60306-17NJ	Wall	ND	West building/N-center section, North of windows
60306-18NJ	Field Blank	ND	Field Blank

* Arochlor 1260

** ND - None Detected at Minimum Detection Limit of 200 ug/M^2 or laboratory analysis limit of 50 ug.

TABLE 4-4

PCDD/PCDF Wipe Sampling Results

NCC Field Sample #	Sample Type	Surface Concentration	Sample Location
60306-19NJ	Floor	AR *	East building/N-end
60306-20NJ	Floor	AR	East building/N-center
60306-21NJ	Floor	AR	East building/Center
60306-22NJ	Floor	AR	East building/E-center
60306-23NJ	Floor	AR	East building/W-center
60306-24NJ	Floor	AR	East building/S-center
60306-25NJ	Floor	AR	East building/S-end
60306-26NJ	Floor	AR	West building/N-end
60306-27NJ	Floor	AR	West building/N-center
60306-28NJ	Floor	AR	West building/E-center
60306-29NJ	Floor	AR	West building/W-center
60306-30NJ	Floor	AR	West building/S-end
60306-31NJ	Wall	AR	East building/N-end of east wall
60306-32NJ	Wall	AR	East building/N-side of east doors
60306-33NJ	Wall	AR	East building/S-side of east doors
60306-34NJ	Wall	AR	West building/N-wall east of door
60306-35NJ	Wall	AR	West building/N-center section, North of windows
60306-36NJ	Field Blank	AR	Field Blank

* AR - Archive Sample, retained in storage at Battelle Columbus Laboratory.

TABLE 4-5

PCDD/PCDF
Air Sample Analytical Results

NCC Field Sample #	Lab	Sample Location	Concentration (pg/M^3) TCDD	TCDF
60303-1NJ	BCL	West building/Pump 1 Southwest quad/West wall	ND	ND
60303-2NJ	UMEA	West building/Pump 2 Northwest quad	ND	3.0
60303-3NJ	UMEA	East building/Pump 3 South center	ND	3.6
60303-4NJ	BCl	East building/Pump 4 Northeast quad	ND	2.8
60303-5NJ	UMEA	East building/Pump 5 Northeast corner/Outdoor air	ND	2.4
60305-1DB	UMEA	West building/Pump 2 Northwest quad	ND	2.3
60305-2DB	UMEA	East building/Northeast corner/Pump 5/Outdoor air	ND	2.6
60306-1DB	UMEA	East building/Pump 4/ Northwest quad	ND	3.6
60306-2DB	C-DOH	East building/Pump 3/ South center wall	NA	NA
60306-3DB	C-DOH	West building/Pump 1/ Southwest quad	NA	NA
ARITHMETIC AVERAGE:		(2 BUILDINGS)	ND	3.1
		(2 OUTDOOR AIR)	ND	2.5

ND - None Detected above minimum detection limit
NA - Not Available as of 9/30/86

TABLE 4-6

Analytical Results, Total PCDD/PCDF Congeners (pg/M^3)

UMEA	Tetra-		Penta-		Hexa-		Hepta-		Octa-	
Results	D	F	D	F	D	F	D	F	D	F
Indoor:										
60303-2NJ	ND	3.0	ND	4.2	0.77	1.2	1.4	0.76	0.44	0.16
60303-3NJ	ND	3.6	ND	4.1	0.65	1.2	1.1	0.59	0.60	0.17
60305-1DB	ND	2.3	ND	2.7	0.42	0.59	0.47	0.33	0.33	0.10
60306-1DB	ND	3.6	ND	3.3	0.28	1.4	1.8	1.4	1.2	0.25
Average:	ND	3.1	ND	3.6	0.53	1.1	1.2	0.77	0.64	0.17
Outdoor:										
60303-5NJ	ND	2.4	ND	2.6	0.83	0.70	1.3	0.62	0.83	0.17
60305-2DB	ND	2.6	ND	1.6	0.55	0.35	1.5	0.43	2.3	0.23
Average:	ND	2.5	ND	2.1	0.69	0.53	1.4	0.53	1.6	0.20
Excess Indoor:	ND	0.6	ND	1.5	-0.16	0.57	-0.20	0.24	-0.96	-0.03
Duplicates:										
60303-2NJ	ND	3.0	ND	4.2	0.77	1.2	1.4	0.76	0.44	0.16
60305-1DB	ND	2.3	ND	2.7	0.42	0.59	0.47	0.33	0.33	0.10

ND - None detected above minimum detection limit

TABLE 4-7

WALL WIPE SAMPLE RESULTS

BOYD REPORT - SAMPLES OF MARCH 1986

Item	Location	Result
1	East Building - North side of east doors	ND*
2	East Building - South side of east doors	ND*
3	West Building - North wall east of door	ND*
4	West Building - North center section, north of windows	ND*

*Detection Limit 0.02 $\mu g/cm^2$

Item	Location	Results - $\mu g/cm^2$
1	6A - East Building - Northeast Wall	0.07
2	6B - East Building - West Wall	0.05
3	6C - East Building - East Wall	0.05
4	2A - West Building	0.02
5	2B - West Building	0.01*
6	4A - West Building	0.01
7	4A - West Building	0.01
8	4C - West Building	0.03

*Core Sample at 2B Wall Wipe Location was 1300 mg/kg

APPENDIX A-5

SUMMARY OF DATA

BECHTEL ENVIRONMENTAL, INC.

BUILDINGS AND APPURTENANCES

In April 1987 Bechtel collected concrete core samples of the floors in both the east and west buildings. At selective locations soil samples were collected beneath the concrete.

Table 1 of this Appendix summarizes the core sample analytical results for PCB's, core interval, analytical results, and depth of cores for the east building. Table 2 presents the same information as Table 1 for the west building.

Table 3 of this Appendix summarizes and presents the results of soil analysis from selected soil samples collected below concrete cores from the east and west buildings.

The end of the Appendix contains a figure which plots the locations of all core samples taken from the east and west building.

Table 1

CONCRETE CORING
EAST BUILDING

Sample No.	Depth of Core (in)	PCB Concentrations, ppm 0 - 1/2"[a]	3/8" - 5/8"[b]	Bottom (4")[b]
1	6	29	1.7	-
2	6	110	37	-
3	6 1/2	210	None Detected	-
4	6	200	77	-
5	6 1/2	160	4.9	-
6	5 1/2	130	33	-
7	5	300	111	-
8	5	290	131	-
9	5	360	146	-
10	4 1/2	1,094	499	2.8
11	6 1/2	4,000	3,400[a]	63
12	6	1,400	820	83
13	6 1/2	550	464	17
14	5	1,300	706	1.8
15	4	89	3.8	-
16	4 1/4	26	3.8	-
17	5	34	2.6	-

(a) Arochlor types detected were 1242 and 1260

(b) Arochlor type detected was 1260

Table 2

CONCRETE CORING
WEST BUILDING

Sample No.	Depth of Core (in)	PCB Concentrations, ppm 0 - 1/4"(a)	3/8" - 5/8"(b)
1	5 3/4	120	91
2	6 1/2	110	32
3	5	140	59
4	6 1/4	83	0.7
5	6	21	5.5
6	4 1/4	190	115
7	6 1/2	320	180
8	5	200	4.1
9	4	260	64
10	6	100	28
11	6 1/2	330	207
12	4 1/4	30	3.8
13	5	89	58
14	6	110	14
15	5 1/2	58	3.4
16	6	120	13
17	4 1/2	140	1.5
18	5	280	86
19	4 3/4	190	23

(a) Arochlor types detected were 1242 and 1260

(b) Arochlor type detected was 1260

Table 2

CONCRETE CORING

WEST BUILDING (Cont'd)

Sample No.	Depth of Core (in)	PCB Concentrations, ppm 0 - 1/4"[a]	3/8" - 5/8"[b]
20	5	310	34
21	5 1/2	100	4.0[c]
22	4 1/2	120	11
23	6	360	7.3
24	5	3.3	0.7
25	9 1/2	340	169
26	5	85	41
27	5 1/4	160	38
28	5 1/2	65	25
29	6	75	3.6
30	6	360	20

(a) Arochlor types detected were 1242 and 1260

(b) Arochlor type detected was 1260

(c) Arochlor types detected were 1254 and 1260

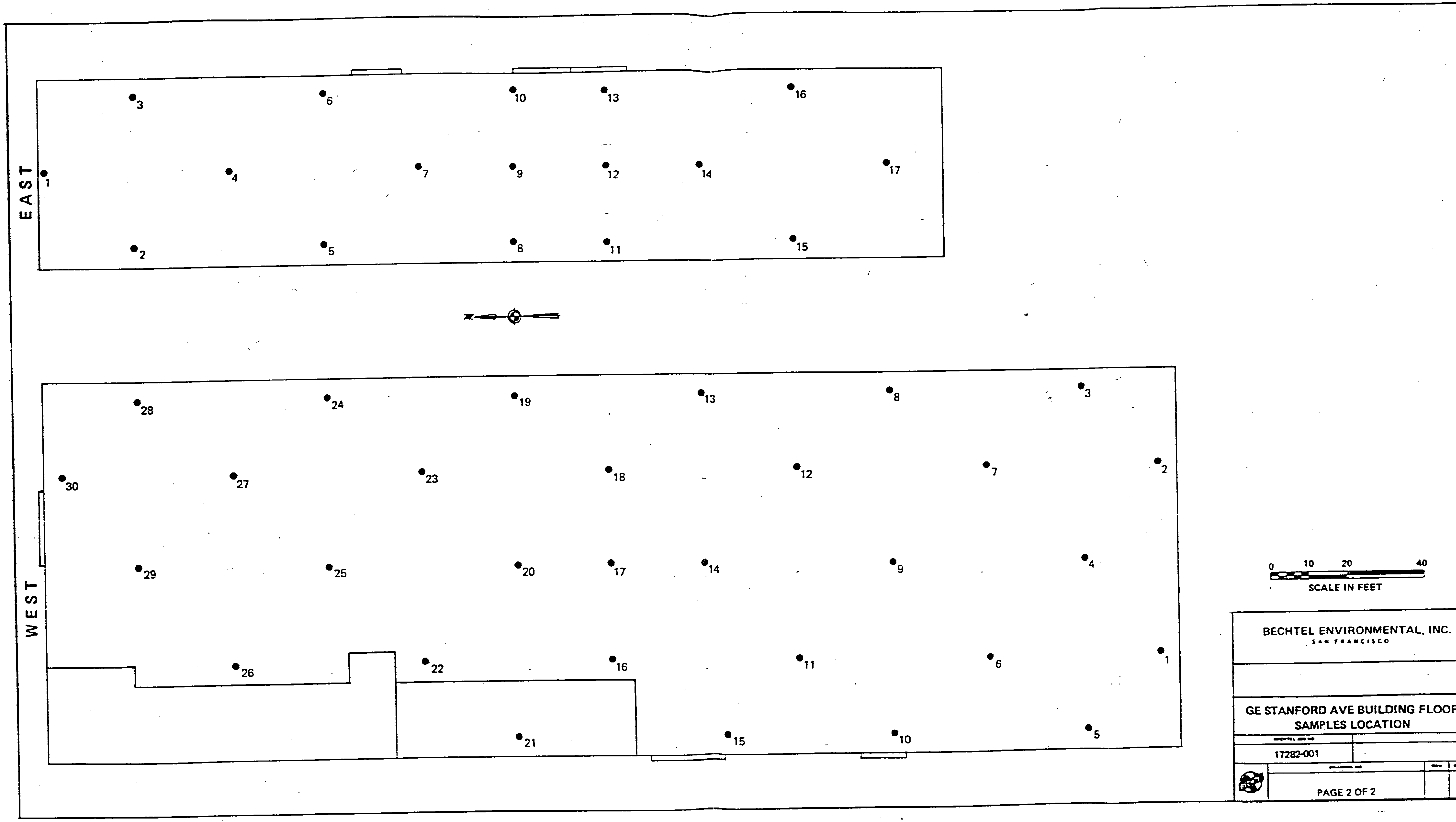
Table 3

SOIL SAMPLES

Sample No.	PCB Type	PCB Concentrations, ppm
E-3	1260	0.2
E-6	-	None Detected
E-10	1260	1.3
E-11	1260	1,040
E-12	-	None Detected
E-13	1260	0.3
E-14	1260	0.1
E-16	1242, 1260	0.8
W-8	1260	0.9
W-19	1260	0.4

Footnote:

Trace soil contamination detected is believed to be due to cross contamination due to the sample collection method. The method employs a concrete saw which cores through the floor with a carbide blade. The blade is coated by flushing with water. In core samples where surface contaminant concentration was detected at high levels, it is believed that the water assisted sediments in migrating to the soil. In the case of sample E-11, significant contamination was encountered. The source of contamination in this area is believed to be from the adjacent subsurface valve box. This valve box is suspected to be the source of accumulation since it is within the drainage pattern of the building and surface contamination in this area is extremely high (1,094-4,000). Soil in this area is likely to be contaminated and the E-11 core sample was collected within one foot of the valve box.



BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

GE STANFORD AVE BUILDING FLOOR
SAMPLES LOCATION

17282-001

PAGE 2 OF 2

APPENDIX A-6

BECHTEL NATIONAL, INC.

June - August 1985 Sampling

During June-August 1985, Bechtel National, Inc. conducted a pre-excavation verification and sampling program at the Endura facility. Results obtained from the sampling program were used as the basis for limiting the proposed railroad area excavation.

Soil samples were taken from the railroad right of way as shown in Figure 1 and analyzed for PCB's. Field verification activities were conducted by Bechtel using the McGraw-Edison PCB Field Test Kit. Verification analyses were conducted on samples sent to McGraw-Edison and the General Electric Denver laboratories and on selected samples sent to Brown and Caldwell. Table 1 shows the McGraw-Edison Field Test Kit results; Table 2 shows verification of Brown and Caldwell results.

Subsurface samples were also collected at this time in order to establish the vertical extent of contamination and to establish excavation limits for any remedial activities. Subsurface sample locations are presented in Figure 2. Details describing subsurface sample locations and subsurface sample results can be found in Tables 3 and 4, respectively.

The results of the analyses performed showed a dramatic decrease in contamination with depth. Table 5 illustrates the decreasing concentrations at several locations along the right of way.

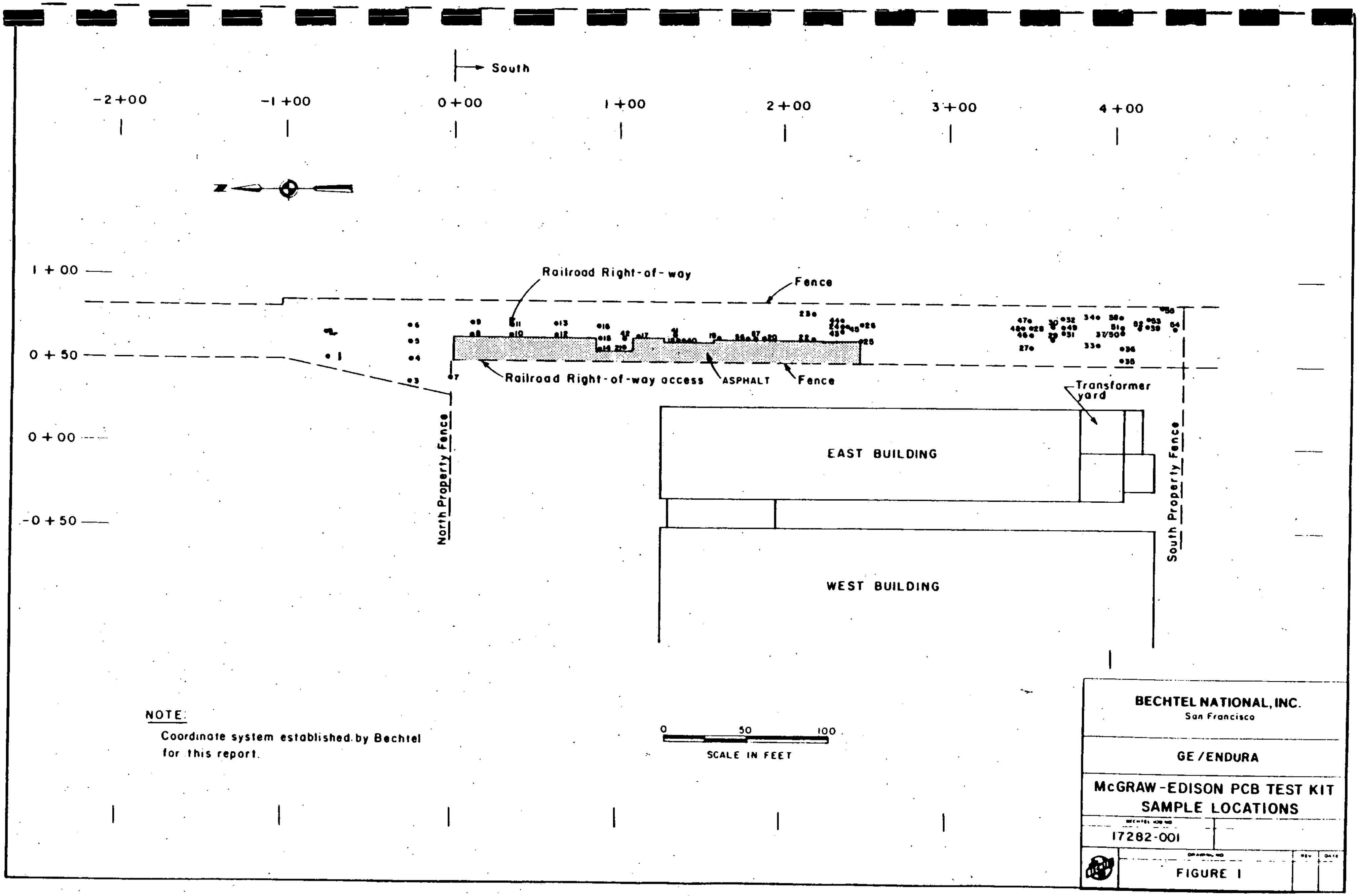

South
-2+00
-1+00
0+00
1+00
2+00
3+00
4+00
1+00
0+50
0+00
-0+50
Railroad Right-of-way
Fence
Railroad Right-of-way access
ASPHALT
Fence
Transformer yard
North Property Fence
South Property Fence
EAST BUILDING
WEST BUILDING
NOTE:
Coordinate system established by Bechtel for this report.
0
50
100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
GE/ENDURA
McGRAW-EDISON PCB TEST KIT SAMPLE LOCATIONS
17282-001
FIGURE 1

TABLE 1

MCGRAW-EDISON PCB FIELD TEST KIT RESULTS

JUNE 1985 SAMPLES

Location	Sample Identification	Sample Date	Probe Response mv	PCB Ar 1242 (or) ppm	PCB Ar 1260 ppm
S75 E50	1	6/17	147	<36	<16
S75 E65	2	6/17	155	<36	<16
S25 E36	3	6/17	150	<36	<16
S25 E50	4	6/17	135	<36	<16
S25 E60	5	6/17	144	<36	<16
S25 E70	6	6/17	153	<36	<16
S00 E40	7	6/17	155	<36	<16
S12 E64	8	6/17	159	<36	<16
S12 E72	9	6/17	157	<36	<16
S37 E64	10	6/17	144	<36	<16
S37 E72	11	6/17	143	<36	<16
S62 E64	12	6/17	149	<36	<16
S62 E72	13	6/17	132	<36	<16
S87 E57	14	6/17	133	<36	<16
S87 E64	15	6/17	154	<36	<16
S87 E72	16	6/17	138	<36	<16
S112 E63.5	17	6/17	140	<36	<16
S137 E63	18	6/17	69	435	168
S162 E63.5	19	6/17	132	<36	<16
S189 E64	20	6/17	133	<36	<16
S105 E59	21	6/18	133	<36	<16
S219 E64	22	6/17	133	<36	<16
S219 E80	23	6/17	143	<36	<16
S236 E73	24	6/17	130	36	16
S247 E64	25	6/17	147	<36	<16
S247 E73	26	6/17	140	<36	<16
S350 E60	27	6/17	141	<36	<16
S350 E73	28	6/17	130	36	16
S363 E65	29	6/17	159	<36	<16

TABLE 1 (Cont'd)

MCGRAW-EDISON PCB FIELD TEST KIT RESULTS

JUNE 1985 SAMPLES

Location	Sample Identification	Sample Date	Probe Response mv	PCB Ar 1242 (or) ppm	PCB Ar 1260 ppm
S363 E74	30	6/17	159	<36	<16
S370 E69	31	6/17	64	528	204
S370 E78	32	6/17	104	100	44
S390 E63	33	6/17	158	<36	<16
S390 E80	34	6/17	157	<36	<16
S405 E53	35	6/17	140	<36	<16
S405 E60	36	6/17	148	<36	<16
S405 E70	37	6/17	-5	10,000	2150
S405 E79	38	6/17	121	48	20
S420 E73	39	6/17	145	<36	<16
S139 E66	40	6/18	135	<36	<16
S136 E65.5	41	6/18	120	52	24
S105 E63	42	6/18	Not Tested	-	-
S236 E69	43	6/18	Not Tested	-	-
S236 E76	44	6/18	100	120	52
S240 E73	45	6/18	132	<36	<16
S350 E69	46	6/18	137	<36	<16
S350 E77	47	6/18	132	<36	<16
S346 E73	48	6/18	122	48	20
S370 E73	49	6/18	36	1660	604
S405 E70	50	6/18	-8	10,400	3000
S405 E73	51	6/18	31	2,200	732
S415 E73	52	6/18	-20	16,000	>4000
S420 E77	53	6/18	42	1,296	476
S436 E73	54	6/18	105	96	44
S428 E80	55	6/18	144	<36	<16
S181 E63	56	6/18	Not Tested	-	-
S185 E62	57	6/18	27	2,500	852

TABLE 2

MCGRAW-EDISON PCB TEST KIT RESULTS

FEBRUARY 1985 SAMPLES

VERIFICATION OF B & C RESULTS

Sample ID	Probe Response mV	PCB (Ar 1242) ppm	(or)	PCB (Ar 1260) ppm	B&C PCB (Total) ppm
D1	150	<36		<16	52
D2	124	44		20	310
E1	126	44		20	110
F1	129	40		16	290
G1	116	64		28	1100
G2	150	<36		<16	120
H1	126	40		20	820
H3	118	56		24	57
I1	130	36		16	160
L1	51	960		340	2500
M1	138	<36		<16	110
N1	115	68		28	360
N2	150	<36		<16	330
S3	35	1800		680	5200

TABLE 4

MCGRAW-EDISON PCB TEST KIT AND MCGRAW-EDISON

JULY 1985 SUBSURFACE SAMPLE RESULTS

SAMPLE ID	PROBE RESPONSE mV	PCB (AROCLOR 1242) ppm	PCB (AROCLOR 1260) ppm	GE DENVER LABORATORY TOTAL PCB ppm
Z1-A	136	<36	<16	20
Z1-B	158	<36	<16	0.57
Z2-A	149	<36	<16	0.43
Z2-B	155	<36	<16	0.09
Z3-A	153	<36	<16	1.90
Z3-B	151	<36	<16	0.14
Z4-A	154	<36	<16	0.03
Z4-B	157	<36	<16	0.02
Z5-A	148	<36	<16	38
Z5-B	151	<36	<16	1.60
Z6-B	151	<36	<16	4.6
Z7-B	154	<36	<16	0.97
Z8-B	157	<36	<16	0.79
Z9-B	155	<36	<16	2.5
Z10-B	148	<36	<16	3.0
Z11-A	153	<36	<16	0.09
Z12-A	154	<36	<16	11.4
Z13-A	156	<36	<16	8.4
Z14-A	154	<36	<16	0.67

Note: See Table 3 for sample details

TABLE 5

PCB CONCENTRATIONS WITH DEPTH

SAMPLE ID	COORDINATES	DEPTH (ft)	CONCENTRATION (ppm)
*M-E 50	S405 E70	0	3000(1260)/10400(1242)
Z 1A	S405 E73	1.2 - 1.5	20
Z 1B	S405 E73	2.4 - 2.75	0.57
M-E 54	S436 E73	0	44(1260)/96(1242)
Z 2A	S437 E76	1.25 - 1.6	0.43
Z 2B	S437 E76	2.3 - 2.7	0.09
M-E 49	S370 E73	0	604(1260/1660(1242)
Z 3A	S370 E73	1.4 - 1.75	1.9
Z 3B	S370 E73	2.7 - 3.0	0.14
G1**	S050 E66	0	1100
Z 5A	S050 E66	1.25 - 1.6	38
Z 5B	S050 E66	2.2 - 2.6	1.6

*McGraw-Edison PCB Test Kit Results

**Taken February 1985

APPENDIX A-7

BECHTEL ENVIRONMENTAL, INC.

November - December 1987 Sampling

In November - December 1987, Bechtel Environmental, Inc. performed borings along the railroad right-of-way for preliminary confirmation of previous sampling efforts. A composite wall sample was collected in the general area of the east building where Brown and Caldwell previously identified PCB contamination.

Figure 1 shows the locations of the borings. Table 1 presents the coordinates for the boring locations along the railroad right-of-way. Table 2 presents preliminary results of the intervals that were analyzed at each boring location.

BORING LOCATIONS AT THE RAILROAD RIGHT OF WAY

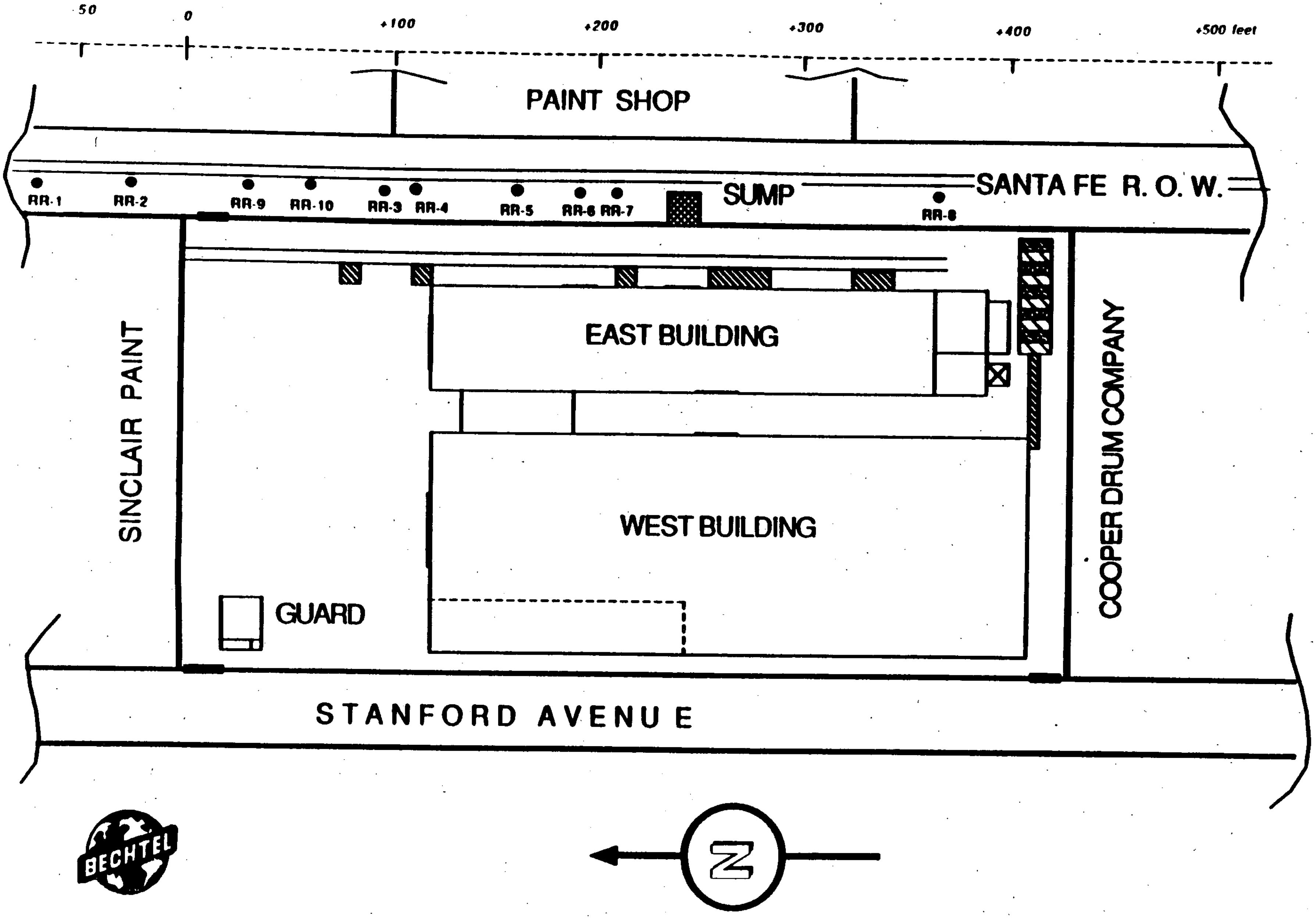


Figure 1

A7-3

TABLE 1

RAILROAD RIGHT-OF-WAY BORING COORDINATES

Boring	North/South Coordinate (feet)	East Coordinate (feet)
RR-1	-75'	3'*
RR-2	-25'	4'*
RR-3	+95'	17'
RR-4	+125'	17'
RR-5	+160'	16'
RR-6	+190'	17'
RR-7	+210'	18'
RR-8	+365'	8'
RR-9	+30'	17'
RR-10	+60'	17'

Note: Reference for the boring locations are the northern property line for north/south references and the east fence at the east/west reference. Borings referenced north/south are (+) if south of the reference and (-) if north of the reference. All borings were east of the east/west reference.

*RR-1 and RR-2 were referenced west of the western most railroad track.

GE STANFORD AVENUE
SUMMARY OF PCB ANALYSES
RAILROAD RIGHT OF WAY

SAMPLE LOCATION	RESULTS (mg/kg)	DUPLICATE (mg/kg)
RR-1-A	0.9	
RR-1-B	ND	ND
RR-2-A	11.0	
RR-2-B	0.1	
RR-3-A	41.0	
RR-3-B	ND	
RR-4-A	4.6	
RR-4-B	ND	ND
RR-5-A	1.6	
RR-5-B	0.2	
RR-6-A	7.1	
RR-6-B	ND	
RR-7-A	5.3	
RR-7-B	0.9	
RR-8-A	7.4	
RR-8-B	26.0	23.0
RR-9-A	110.0	
RR-10-A	42.0	

FOOTNOTE: A= 0-6" interval, B= 1'-1'-6" interval

APPENDIX B

SAMPLING PLAN

FOR THE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT THE

GE STANFORD AVENUE FACILITY

RR:6046r

Section 1

INTRODUCTION

This plan outlines the investigation to be conducted at the GE Stanford Street facility in Los Angeles, California. GE purchased the property in 1942 and operated a transformer repair facility until 1971. In 1971, GE sold the property to Endura Metals which operated a facility that manufactured stainless steel counters and sinks. In 1986, Endura Metals vacated the facility due to contamination from previous GE operations.

This plan addresses additional investigation of the railroad right of way, asphalted surfaces, ground water, and the walls of the buildings.

The objectives of the work described in this plan are:

- o to supplement data to determine the extent of contamination,
- o to fill data gaps from prior investigation and,
- o to characterize the site for cleanup or remediation

1.1 PREVIOUS SITE INVESTIGATIONS

Several investigations of chemical contamination on the GE property have been conducted. A chronology of events may be found in Section 1 of the workplan. A summary of investigation results may be found in Appendix A of the workplan. Previous investigations led to several cleanup operations. Subsequent flooding of the facility has recontaminated much of the previously cleaned areas. Several investigations since the flooding have attempted to characterize the recontamination. This sample plan will attempt to complete the characterization and, additionally, investigate areas which have little or no existing data.

Quality Control, Health and Safety, and sampling protocols will be adhered to as set forth in Appendices C and D of the workplan.

Section 2

TECHNICAL APPROACH

Characterization will be accomplished by the collection and analysis of samples representative of various facility areas. Samples will be analyzed for PCBs. Additional sample collection and analysis may be required to define the extent of any contamination detected in areas which cannot be fully defined. A report summarizing all findings will be prepared. Procedures and protocol will be followed as described in Appendix C and D of the workplan.

Investigation will be performed in the following facility areas:

Area 1: Railroad Right-of-Way and Associated Sump

Area 2: Buildings and Appurtenances

Area 3: Exterior Facilities

Preliminary Ground-Water Investigation

The work to be performed in each of these areas is described below, and the locations are shown in Figure 2.0.

2.1 AREA 1: RAILROAD RIGHT-OF-WAY AND ASSOCIATED SUMP

2.1.1 Railroad Right-of-Way

Samples from shallow borings (approx. 5 feet) will be collected at four general locations along the western side of the railroad tracks. Several samples will be collected at different depths at each of the sample locations (see Figure 2.1). Sample locations selection is based on the results of past investigations, that these areas are contaminated, and the depths of the contamination is unknown. Data exists for other area adjacent to the tracks. A total of seven distinct locations have been selected. Samples will be collected at one foot intervals at each boring location. Borings will be performed with hand-augers. The samples collected, will be logged with respect to their location and depth. Sample analyses will begin by analyzing the surface and the shallowest interval (1 foot). If any of the results are positive, for a particular boring location, the next interval will be analyzed. Analyses of samples at each interval will continue until contamination levels are below 25 ppm. In the event contamination is found above 25 ppm at the deepest interval (5 feet), further sampling will be required. Samples will be collected, handled, and analyzed as specified in Appendix C and D of the workplan.

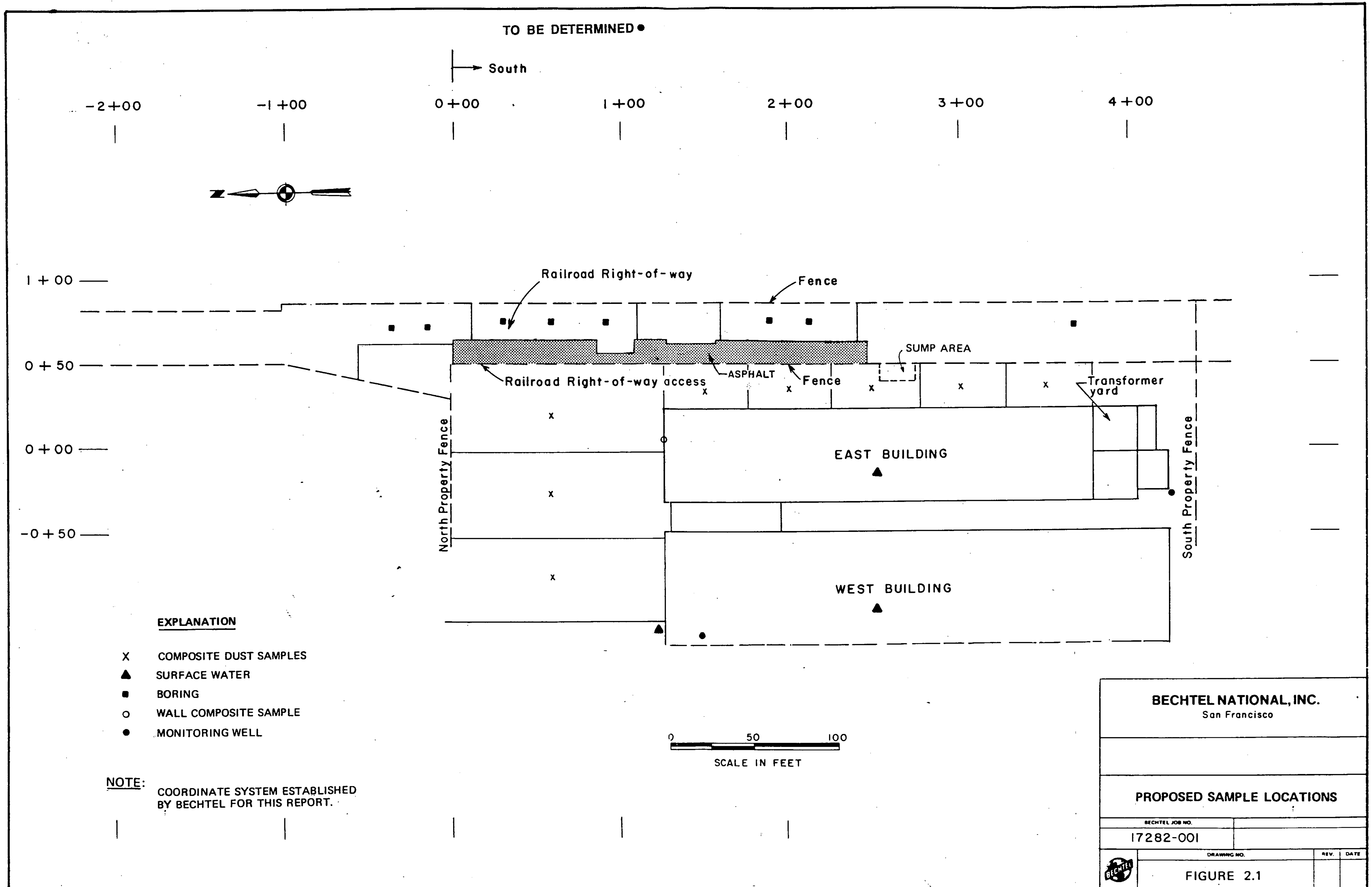
2.1.2 Previous Exterior Sump Area

Samples from shallow borings (approx. 5 feet) will be collected at one location in the vicinity of the concrete sump area adjacent to the eastern perimeter of the facility. Several samples will be collected at different intervals at the location. Soil samples will be collected at the surface and at one foot intervals to a depth of five feet. Borings will be performed with hand-augers. The samples collected will be logged with respect to their location and depth. Sample analyses will begin by analyzing the surface and the shallowest interval (1 foot). If any of the results greater than 25 ppm, the next interval will be analyzed. In the event contamination is found, greater than 25 ppm, at the deepest interval (5 feet), further sampling will be required. Samples will be collected, handled, and analyzed as specified in Appendix C and D of the workplan.

2.2 AREA 2: BUILDINGS AND APPURTENANCES

2.2.1 Walls

The walls of both buildings are constructed of red brick. PCB contamination has been detected in at least one core sample. In an effort to verify contamination in the previously sampled wall, the wall will be sampled at three locations adjacent to the original boring. The samples will be collected by utilizing a hand-held drill to core samples of brick material, at each location. A portion of each core sample location will be ground-up to generate the sample. The remaining portions of the samples from each location will be labelled, logged, and stored in the event additional layers of analysis is required. All samples will be properly collected, handled, and analyzed for PCB's, as specified in Appendix C and D of the workplan.


TO BE DETERMINED
South
-2+00
-1+00
0+00
1+00
2+00
3+00
4+00
1+00
0+50
0+00
-0+50
Railroad Right-of-way
Fence
SUMP AREA
Railroad Right-of-way access
ASPHALT
Fence
Transformer yard
North Property Fence
South Property Fence
EAST BUILDING
WEST BUILDING
EXPLANATION
X COMPOSITE DUST SAMPLES
SURFACE WATER
BORING
WALL COMPOSITE SAMPLE
MONITORING WELL
NOTE: COORDINATE SYSTEM ESTABLISHED BY BECHTEL FOR THIS REPORT.
0
50
100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
PROPOSED SAMPLE LOCATIONS
BECHTEL JOB NO.
17282-001
DRAWING NO.
REV.
DATE
FIGURE 2.1

2.2.2 Surface Water

Surface water samples will be collected if and when sufficient rain or other hydrologic condition allows sufficient quantities of water to pool on-site. At least one surface sample will be collected from the floor of both buildings. The two samples will be collected, handled and analyzed for PCB's, as specified in Appendix C and D of the workplan.

2.3 AREA 3: EXTERIOR FACILITIES

2.3.1 Exterior Surfaces

The exterior facilities of the GE site consist of the surfaces constructed of concrete and asphalt. Surface dust and sediment composite samples will be collected in the general areas as proposed in Figure 2.1. A total of five samples per area will complete the composite. Discrete samples will be archived and retained for future reference. The samples will be collected, handled and analyzed as specified in Appendix C and D of the workplan.

2.3.2 Surface Water

A surface water sample will be collected if and when sufficient rain or hydrologic condition allows sufficient quantities of water to drain offsite. The sample will be collected at the drain located onsite (see Figure 2.1). The sample will be collected, handled, and analyzed as specified in Appendix C and D of the workplan.

2.4 GROUND-WATER INVESTIGATION

As a preliminary step in characterizing ground-water conditions at this site, a limited number of monitoring wells will be installed. The primary purpose of these wells will be to confirm flow direction and depth to water, and to identify the kinds of geologic materials underlying the site. Because presumed ground-water flow direction is to the west or southwest, there is most likely no position onsite where a well can be placed to be upgradient of the area of contaminated soil along the railway. It follows that all or most of the site should be downgradient of the area of contaminated soil. Therefore, the two wells will be placed onsite as shown in Figure 2-1 and an upgradient well may be located offsite to the east or northeast. These three wells will be used to determine flow direction beneath the site. One well will be on the southern margin of the site and one well will be on the western margin of the site and should be downgradient of the site as a whole. If there has been contamination of ground-water at the site, one or both of these wells is likely to intercept such contamination.

Ground-water samples will be collected from these wells and sent to a certified commercial laboratory for analysis. The preliminary round of sampling will be analyzed for PCB's and volatile organic compounds listed in Table 2.2.

The preliminary wells will be completed with 20 feet of screen at the top of the saturated zone. The upgradient well will be completed with stainless steel screen and casings in the saturated zone, and the downgradient wells will be constructed entirely of PVC. All wells will be 4-inch diameter. These wells will serve primarily to confirm local flow direction.

Further Investigation

If any of the three preliminary wells encounters ground-water contamination caused by site operations, additional wells will be installed to identify the extent of that contamination.

Table 2.2

ANALYTICAL PARAMETERS

VOLATILE ORGANICS - EPA METHOD 8240(1)

Acrolein	2-Chloroethyl vinyl ether
Acrylonitrile	Chloroform
Benzene	1,2-Dichloropropane
Toluene	1,3-Dichloropropene
Ethylbenzene	Methylene Chloride
Carbon Tetrachloride	Methyl Chloride
Chlorobenzene	Methyl Bromide
1,2-Dichloroethane	Bromoform
1,1,1-Trichloroethane	Dichlorobromomethane
1,1-Dichloroethane	Trichlorofluoromethane
1,1-Dichloroethylene	Chlorodibromomethane
1,1,2-Trichloroethane	Tetrachloroethylene
1,1,2,2-Tetrachloroethane	Vinyl Chloride
Chloroethane	trans-1,2-Dichloroethylene

PCB'S - EPA METHOD 8080(2)

PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260

(1) Test Methods for Evaluating Solid Waste, U.S. Environmental Protection Agency, SW-846, November 1986.
(2) PCB's concentration will be reported as the total of all isomers.

APPENDIX C

HEALTH AND SAFETY PLAN

FOR THE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT THE

GE STANFORD AVENUE FACILITY

HEALTH AND SAFETY PLAN

FOR

SITE REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT THE

GE STANFORD AVENUE SITE

Prepared By

BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO

SEPTEMBER 1987

Prepared by: ______________________________

Christopher M. Valentino

Reviewed by: ______________________________

Kenneth E. Barr
Project Manager

Approved by: ______________________________

Karl J. Leist, CIH
Bechtel Environmental, Inc.
Health and Safety Manager

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 INTRODUCTION

This Health and Safety Plan has been developed specifically for the site investigation activities planned by Bechtel Environmental, Inc. (BEI) at General Electric's (GE) Stanford Avenue facility. Existing information on the facility and data from previous investigations were used to prepare this plan.

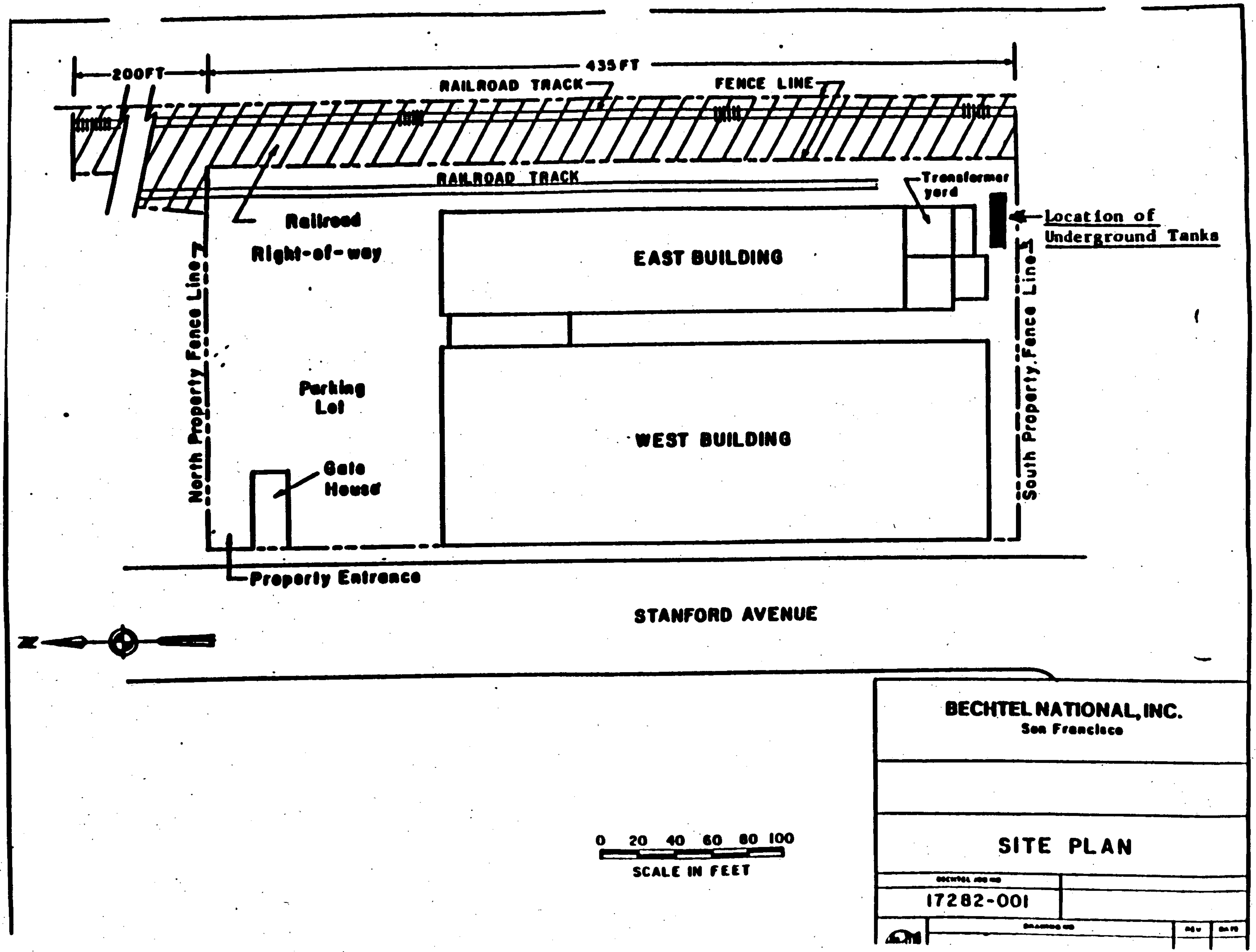
Although this plan is designed to be specific with regard to the planned work activities and potential encounters with contaminants, a degree of flexibility has been incorporated due to the nature of this type of field work. Conditions may change during the course of the investigation or unforeseen situations may arise that require deviations from the original plan. Therefore, the provision is made to allow modification to this plan when warranted by authorized field personnel and when approved by the cognizant BEI managers.

2.0 SITE EVALUATION

2.1 SITE DESCRIPTION

The Stanford Avenue facility is located in a light industrial area and is bounded on the west by Stanford Avenue and on the east by the Southern Pacific Railroad right-of-way. Two buildings (now vacant) are located on the property; one is 50 feet wide by 300 feet long and the other is 100 feet wide by 300 feet long. The remainder of the site is covered by concrete and asphalt. A site plan is shown in Figure 1.

Previous investigations by BEI and other consultants have identified polychlorinated biphenyl (PCB) contamination in the soil along the railroad right-of-way, on the outdoor concrete and asphalt surfaces near the east building, and on the floor surfaces of both the east and west buildings. During the past three years, remediation efforts have been carried out to excavate and replace contaminated soil along the railroad tracks, clean the outdoor concrete and asphalt surfaces around the east building, and clean the floor and wall surfaces inside both site buildings. These efforts have not


200 FT
435 FT
RAILROAD TRACK
FENCE LINE
RAILROAD TRACK
Transformer yard
Location of Underground Tanks
Railroad Right-of-way
EAST BUILDING
North Property Fence Line
South Property Fence Line
Parking Lot
WEST BUILDING
Gate House
Property Entrance
STANFORD AVENUE
N
0 20 40 60 80 100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
SITE PLAN
17282-001

been completely successful. Therefore, BEI is assisting GE with the final clean-up of the railroad right-of-way and the interior surfaces of the two buildings.

However, prior to initiating any further remediation activities, more data must be collected from the railroad track areas, surfaced areas and the interior walls.

2.2 PLANNED ACTIVITIES

The work plan for the Stanford Avenue site consists of several sampling schemes. These are:

- Boring and soil sampling in the area around the railroad tracks
- Sampling the surface areas
- Coring/scraping of the interior walls
- Drilling and installation of monitoring wells

2.3 SOIL HAZARD ANALYSIS

PCB Exposure

The task of sampling PCB-contaminated soil and the buildings from the site involves potential inhalation and dermal exposure to PCBs. The results of a BEI investigation completed in April 1985 indicate that levels of PCBs (Aroclors 1242 and 1260) up to 5200 ppm exist along the tracks. However, only 14 of 52 samples collected were greater than 50 ppm (and only 3 were greater than 1000 ppm). Ten samples showed PCB concentrations in the range of 50 to 500 ppm. Previous air sampling studies also reported non-detectable levels of dioxins and PCBs in this area.

Acute skin exposure to high levels of PCBs (1000's ppm) is known to cause chloroacne, pigmentation of the skin, and edema of the face. PCBs have also been associated with liver cancer in rats. PCBs are also lipid soluble material and are easily stored in fatty tissues.

Exposure Guidelines

For worker exposure to PCBs, the California OSHA 8-hour Time Weighted Average (TWA) Permissible Exposure Level (PEL) as well as the American Conference of Governmental Industrial Hygienists' TWA Threshold Limit Value (TLV) are the same: 1.0 mg/m^3 for PCBs containing 42% for PCBs containing 42% chlorine by weight (PCB 1242), and 0.5 mg/m^3 for PCBs containing 54% chlorine (PCB 1254). The National Institute for Occupational Safety and Health, citing the potential for carcinogenic effects from PCBs, has established a recommended exposure guideline of 1 ug/m^3 (0.001 mg/m^3) as a 10-hour TWA for any PCB exposure.

A potential inhalation and dermal exposure situation exists for workers performing work along the right-of-way. Since PCBs are essentially non-volatile and are normally tightly bound to soil, an inhalation hazard should exist only under dusty conditions. Proper work practices and dust controls will be implemented to avoid these conditions. The possibility of skin exposure is a more likely possibility and will be controlled through the use of protective clothing (i.e., gloves, coveralls, and boots).

Sampling of the building interior walls surfaces is expected to present both inhalation and dermal exposure hazards. Dust generated from the coring activities could present a potential inhalation problem. As a result of this exposure potential, respirators will be worn during the indoor sampling activities as well as eye protection. The possibility of skin exposure will be controlled through the use of protective clothing (i.e., gloves, coveralls, and boots).

Organic Solvents

Typical organic solvents that may have been used at the site include such compounds as methyl ethyl ketone, trichloroethene, acetone, toluene, methylene chloride and butanone. These compounds are all highly volatile and may present an inhalation exposure potential.

The highest potential for personnel exposure to these compounds is by inhalation of the organic vapors generated by these compounds during drilling activities. Therefore, during the drilling activities and other excavation activities that warrant possible exposure, a direct reading instrument, a Photovac Tip I (a photo-ionization detector) will be used to monitor concentration of organic vapor in the employee's breathing zone. If levels of organic vapor are detectable in the breathing zone, respiratory portection will be required.

Exposure Guideline

Table 2-1 presents the OSHA TWA, PEC and ACGIH TLV's for the above compounds. In addition, symptoms associated with exposure to these compounds are noted.

Table 2-1

Exposure Levels

Compound	TWA PEL (mg/m^3)	TLV (mg/m^3)	Symptoms of Exposure
Methyl ethyl ketone	590	350	dizziness, disorientation, nausea
Trichloroethene	1900	1900	"
Acetone	2400	1780	"
Toluene	NA	375	"
Methylene chloride	NA	350	"
Butanone	590	350	"

2.4 PHYSICAL HAZARDS

Safety hazards will be typical of those associated with construction activities and heavy equipment (drill rig, backhoe). The hazards include excessive noise, underground or overhead utilities (electrical and gas), scaffolding, and use of pressurized air lines. As a standard practice all employees and visitors must wear a hard hat, in addition to suitable clothing and sturdy work shoes. Should noise from the equipment become excessive, hearing protection will be required. Contact with underground utilities is not likely to occur. However, prior to drilling activities at each site, available records will be checked to determine the location of all underground utility lines. Drilling locations will be adjusted as necessary to avoid contact with the identified utility lines. Additionally, all above ground wiring will be located prior to raising any boom or initiating any excavation activities. Use of pressurized hoses or scaffolding are not anticipated during this investigation.

Additionally, heat stress may be a hazard during hot weather because workers will be in protective clothing. Workers will be required to take breaks as needed to prevent heat stress and to consume adequate quantities of liquid.

3.0 EXPOSURE MONITORING

The proposed exposure monitoring program is intended to:

- Verify the effectiveness of engineering controls and work practice
- Assess employee exposure, and
- Verify appropriate level of protection.

The exposure monitoring program proposed is based on the initial site characterization and will be modified, if necessary, during the course of the project. Initially, the program will rely upon direct reading instruments Photovac Tip I (PID) detector to measure and monitor employee airborne exposure. Employee exposure will also be measured by application of shift long personal monitoring. Sampling strategies will target airborne dusts as well as vapor collection. Employees expected to have the highest potential for exposure (i.e. closest to the source) shall be designated as the highest priority group for personal sampling purposes. If PEL airborne contaminant levels are approached or exceeded, the sampling program will be adjusted in accordance with regulatory requirements and appropriate personnel protection equipment utilized. Sampling results will be categorized by job classification. The average sampling time will be six to eight hours.

Specific air sampling procedures shall be either reviewed beforehand with AIHA* accredited laboratory personnel or by checking an appropriate OSHA or NIOSH** technical manual. An industrial hygiene monitoring data sheet, next page, will be completed for each sample.

In some cases, air samples will be collected on the appropriate media by personal air sampling pumps, then analyzed in a laboratory. PCB's will be collected on floursil tubes, and organic vapors on charcoal tubes.

* American Industrial Hygiene Association
** National Institute for Occupational Safety & Health

ENVIRONMENTAL HYGIENE MONITORING DATA SHEET

THIS INFORMATION IS TO BE HELD STRICTLY CONFIDENTIAL AND IS THE PROPERTY OF THE CONTRACTOR

BECHTEL

		DATE (MO/DA/YR)
SPONSOR/COMPANY NAME	CONTRACT NUMBER	FIELD SAMPLE ID NO
INVESTIGATOR	AGENT MONITORED	IH LOG NO

EMPLOYEE AND WORK AREA DATA

EMPLOYEE NAME		WORK LOCATION DESCRIPTION	BLDG.
JOB TITLE/WORK DUTIES			DEPT.
DAILY TIME AT WORK	TENURE WITH COMPANY		FLOOR

EMPLOYEE COMPLAINT
☐ NO ☐ YES (DESCRIBE)

NUMBER OF EMPLOYEES EXPOSED

VENTILATION
☐ LOCAL EXHAUST ☐ GENERAL ☐ NONE

OTHER CONTROLS
☐ ENGINEERING ☐ ADMINISTRATIVE ☐ PER PROT. EQUIP. (SPECIFY) ☐ NONE

SAMPLE INFORMATION

☐ AREA ☐ BULK ☐ PERSONAL ☐ TOTAL ☐ RESPIRABLE ☐ TWA ☐ CEILING ☐ CHARCOAL TUBE

☐ SILICA GEL ☐ DETECTOR TUBE ☐ OTHER

IMPINGER MEDIUM

FILTER TYPE AND SIZE (μm)

INSTRUMENT	MODEL/ID NO.	CALIBRATION DATE, METHOD

FIELD SAMPLING INFORMATION

TIME	COMMENTS	TIME	COMMENTS
	PUMP ON		
			PUMP OFF
		_____	TOTAL PUMP ON TIME (min)

CALCULATIONS

CALIBRATION

VOLUME _____ L

DATE PRE _____ DATE POST _____

1. _____ 1. _____
2. _____ 2. _____
3. _____ 3. _____
4. _____ 4. _____

AVERAGE _____ SEC

$\frac{\_\_\_\_ L}{sec} \times \frac{60 \text{ sec}}{1 \text{ min}} = \_\_\_\_ \text{ LPM}$

$\_\_\_\_ \text{ LPM} \times \_\_\_\_ \text{ min} \times \frac{1 m^3}{1000 L}$

$= \_\_\_\_ m^3$ (TOTAL SAMPLE VOLUME)

BLANK:
PRE-INSP. WT. _____
POST-INSP. WT. _____
CORRECTION _____

FOR SILICA:
mg. SILICA _____
% SILICA _____

SAMPLE:
END WT. _____
TARE WT. _____
SAMPLE WT. _____
CORRECTION _____
ADJ. WT. _____

SAMPLE ANALYSIS:

SUBSTANCE	mg.	mg/m^3	8-HOUR TWA	TLV (mg/m^3)

Necessary laboratory analyses will be performed by an AIHA accredited laboratory. The analyses will be for PCBs and volatile organic compounds.

Air sampling results will be shared insofar as possible with employees either at special safety briefings or by posting associated reports.

4.0 SITE HEALTH AND SAFETY RESPONSIBILITIES

4.1 BEI POLICY AND GOVERNING PROCEDURES

It is Bechtel policy to provide its employees, its subcontractor personnel and authorized visitors with information and procedures to protect them and the adjacent community from adverse effects that might result from work at jobsites involving hazardous substances. To implement this policy, a health and safety program has been established within BEI to provide the necessary assistance to projects. All personnel involved in the GE/Stanford Avenue remedial activities shall follow the health and safety procedures set forth in this Plan. Bechtel personnel are also governed by Bechtel Safety Department policies and Environmental Operations Procedures regarding health and safety.

Subcontractors, in addition to complying with the requirements of this Plan, shall comply with their own health and safety procedures, which must align with Bechtel procedures. It is the responsibility of the Subcontractor health and safety representative to understand the procedures to be followed at the job site and to coordinate with the BEI representative.

4.2 KEY HEALTH AND SAFETY PERSONNEL

The BEI Site Health and Safety Officer (SHSO) for the GE/Stanford Avenue remedial activities is responsible for the implementation of this Health and Safety Plan, and for the general protection of all workers and visitors during the investigations. The SHSO reports directly to the Hazardous Waste Technology Manager or his designee. The SHSO will also work directly with the BEI Project Engineer, who has primary responsibility for managing all field work at the Stanford Avenue site. The BEI Project Manager is responsible for ensuring project compliance with all applicable health and safety program requirements.

The responsible persons for the Stanford Avenue site work are:

Project Engineer/SHSO - Christopher Valentino
Project Manager - Richard L. Morales

If an unsafe condition arises during the investigations, the SHSO has the authority to temporarily suspend operations until the condition is corrected and he verifies that it is safe to resume work. The SHSO also has the authority to take the following actions:

- Require specific health hazard control precautions prior to work area entry by Bechtel or subcontractor personnel.
- Deny Bechtel or subcontractor personnel access to the work areas or any portion of the work areas.
- Order the immediate evacuation of Bechtel and/or subcontractor employees from any work area.
- Permit visitors (i.e., anyone other than an authorized Bechtel or subcontractor employee) access to work areas only at the direction of and with the permission of GE.
- Restrict visitors from areas of potential exposure to harmful substances and ensure that they abide by the requirements of this Plan.
- Monitor Bechtel and subcontractor operations for the existence of hazardous conditions.
- Ensure that environmental and personnel monitoring operations are on-going and in accordance with technical specifications, procedures, and project instructions.
- Require any Bechtel or subcontractor employee to obtain immediate medical attention in the case of a work-related injury or illness.

The SHSO shall report all work-related illnesses and injuries, as well as all incidents which result in excessive exposures to personnel, to the Environmental Technology Manager or his designee. A written report shall be submitted for each incident.

Additional duties and responsibilities of the SHSO include the following:

- Coordinating with the project engineer and subcontractors in solving health and safety problems.
- Insuring that medical surveillance requirements are met.
- Presenting on-site training to project personnel.
- Determining the level of personal protection required for remedial operations under the existing conditions.
- Enforcement of all health and safety procedures at the site.

Each Bechtel and subcontractor employee is encouraged to bring to the attention of his supervisor and the SHSO any unsafe or potentially hazardous condition that he observes as he carries out his project responsibilities.

5.0 MEDICAL SURVEILLANCE

The purposes of the medical screening program are threefold: to assess the health status of personnel prior to work (i.e., establish a baseline condition and determine their fitness for the anticipated duties); to monitor personnel when necessary for evidence of work-related adverse health effects; and to determine their suitability for future work assignments involving hazardous substances. Therefore, all Bechtel and subcontractor employees shall have successfully completed the required medical evaluation before participating in these field activities. Documentation in the form of a signed physician's statement for each subcontractor employee shall be submitted to the SHSO prior to the start of work. Permanent medical files are maintained by the BEI consulting occupational physician.

Interpretation of the results of Bechtel employee medical examinations is be done by the BEI consulting occupational physician. Subcontractor baseline examination results shall be evaluated by the subcontractor's own physician. However, the Bechtel consulting occupational physician will evaluate all medical results from follow-up exams that are scheduled because of concern about adverse health effects from an on-site exposure.

The baseline health assessment will consist, at a minimum, of the following core elements:

- Review of personal and family medical history
- Review of work history and occupational medical history
- Screening physical examination
- Basic blood chemistry analysis, including complete blood count and standard blood panel (e.g., SMAC-20)
- Standard urinalysis
- Pulmonary function test
- Audiometry

Additional testing may be prescribed by the examining physician based on an individual's medical history or current condition, or because of special project requirements. Such supplemental tests include chest X-ray, electrocardiogram, and special blood analyses. Details of the medical examination criteria are given in the BEI health and safety procedures.

No special or supplemental tests are required for personnel assigned to the remedial activities at the Stanford Avenue site.

If the SHSO determines that significant exposure to hazardous materials is encountered in these investigations, a follow-up medical exam shall be conducted on the exposed individuals. Results of the follow-up exams will be compared to the baseline data for each individual to determine if any observable changes may indicate an over-exposure to toxic substances. The follow-up examination also serves as a rescreening function by allowing the physician to re-evaluate the ability of the individual to perform field activities as required.

6.0 HEALTH AND SAFETY TRAINING

Before beginning field operations, each Bechtel and subcontractor employee assigned to the investigation will be required to submit evidence that he has completed a health and safety training course in accordance with OSHA regulation 1910.120. In addition, a site specific health and safety training session will be presented by the SHSO to all site workers. Visitors will be given abbreviated instructions by the SHSO on the health and safety precautions that are appropriate for the nature of their visit.

The purposes of this training program are to:

- Ensure that the health and safety of all project personnel, visitors, and the public is maintained;
- Ensure compliance with all occupational and environmental health and safety laws, regulations and guidelines;
- Enhance the ability of personnel to react responsibly, safely and quickly to emergency situations; and
- Increase the ability of employees to safely complete their work in an efficient and timely manner.

The SHSO will use the following topical outline to conduct the pre-work training session. It is expected that this training may require up to 2 hours to complete.

<u>Health and Safety Program</u>

- BEI policy
- Site Health and Safety Plan

<u>Role of Site Health and Safety Officer</u>

- Duties and authority
- Compliance with SHSO directives

Project Scope of Work

- Work area orientation
- Work activities
- Key personnel and visitors
- Regulatory concerns

Hazardous Substance Information

- Hazards expected on-site
- Routes of exposure based on work activities
- Effects of exposure
  - Physiological warning signs
  - Acute vs. chronic-latent effects

Hazard Control Program

- Medical surveillance
- Restricted access areas
- Personal protective equipment
- Air monitoring
- Site procedures
- Personal hygiene

Use of Protective Equipment

- Personal protective clothing
  - Protective ensembles
  - Limitations of use
  - Areas of use
- Respiratory protective equipment
  - Selection, fit and use
- Decontamination of clothing and equipment
- Disposal of contaminated clothing and equipment

First Aid and Safety Equipment

- Identification of personnel trained in first aid/CPR
- First aid equipment and location
- Fire extinguisher location
- Eye wash station location

Emergency Contacts and Response Procedures

- Telephone contacts for assistance
- Reporting responsibilities
- Evacuation procedures
- Accident/injury response

The training session will be documented by obtaining the signature of each participant on a roster. No person will be allowed to work in or visit the restricted areas of the Stanford Avenue site without completing the training program and signing the roster.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Most personnel participating in the Stanford Avenue remedial activities will be required to wear some type of personal protective equipment (PPE) to guard against exposure to contaminants. The ensemble of PPE that each individual will be required to wear will be defined by the expected level of contamination in the zone where he is working, his work activities, site conditions, and available characterization data. PPE requirements may be upgraded or downgraded by the SHSO during the course of the investigation as warranted by changing conditions.

The basic protective ensemble for personnel who may come in direct contact with contaminated soil, articles or surfaces will consist of the following:

- Half-face, air-purifying cartridge respirator equipped with NIOSH/MSHA approved cartridges for protection against organic vapors and dusts and mists.
- Tyvek coveralls
- Chemical protective (e.g., nitrile or viton) gloves
- Chemical protective boots, with steel toe
- Hard hat
- Safety glasses

The SHSO will determine when respirators shall be worn according to site conditions or the results of air monitoring performed during the investigation activities. The SHSO will also determine where and when personnel can safely work without wearing the protective equipment listed above. It is possible, for example, that certain investigators may not need to wear protective boots, gloves and coveralls during their work. But they could be required to wear respiratory protection if downwind of contaminated areas when a vapor hazard is present.

In addition, certain personnel (such as those performing equipment decontamination) may be required to wear items which afford a higher degree of protection than those listed above, due to the greater risk of contamination presented by their specific work duties.

As the work progresses, the SHSO will review the protective requirements for each operation. He shall have the responsibility for deciding when protective ensembles should be upgraded or downgraded. If unanticipated conditions are encountered that require additional personal protection, the SHSO shall ensure that appropriate additional equipment is in use prior to continuing field activities under those conditions.

8.0 FIRST AID AND SAFETY

To provide first line assistance to field personnel in the case of a sickness or injury, the SHSO shall have the following items immediately available:

- First aid kit - containing supplies for initial treatment of minor cuts and abrasions, severe lacerations, shock, heat stress, eye injuries, skin irritation, thermal and chemical burns, snake and insect bites and for immobilization of fractures.
- First aid handbook (American Environmental Red Cross or equivalent)
- Portable emergency eyewashes
- Supply of clean water
- Soap or waterless hand cleaner and towels
- Portable cooler with drinking water (or Gatorade) and ice, if needed

Emergency eyewashes and drinking water shall be located near the work areas but outside any restricted area.

If suitable water supplies are not immediately available, or where water use is inappropriate, a 30 pound ABC fire extinguisher shall be available. The subcontractor shall provide the necessary extinguishers and they shall be used at the direction of the SHSO.

9.0 SITE OPERATING PROCEDURES

Procedures for conduct of personnel during the Stanford Avenue remedial activities are established to minimize the possibility of worker exposure to hazardous contaminants. These procedures require the cooperation of all investigators and visitors during the project and will be strictly enforced by the SHSO.

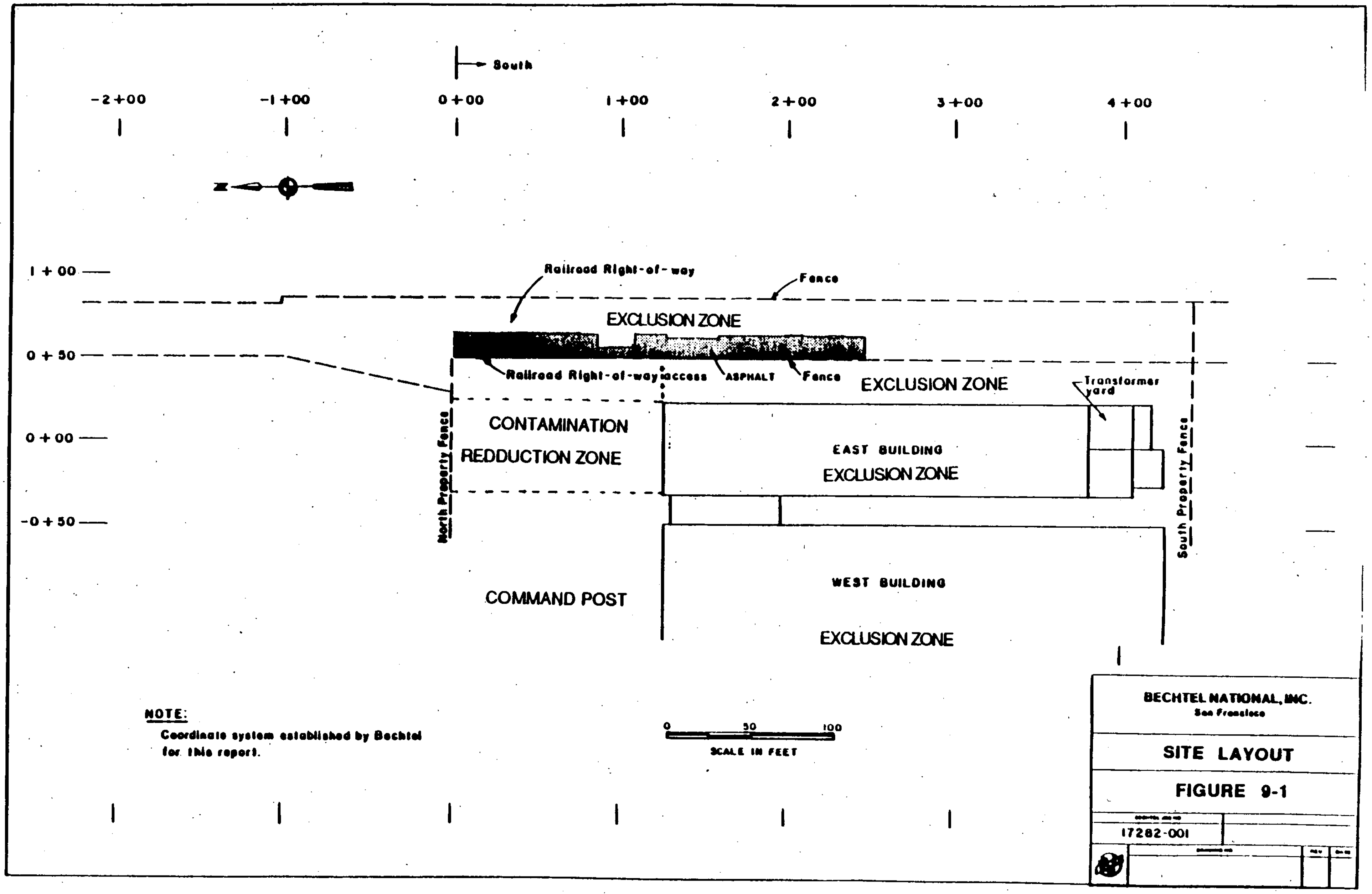
9.1 ACCESS CONTROLS

The SHSO shall establish the physical limits of the contaminated areas at the Stanford Avenue site and shall instruct all investigation personnel and visitors on the boundaries of these restricted areas. No one shall be allowed to enter a restricted area without the required protective equipment for that area. The SHSO shall ensure compliance with all restricted area entry and exit procedures.

The SHSO shall also designate a decontamination point for personnel exit from contaminated areas and entry into the clean area where personnel may rest, eat, drink or smoke.

Visitors should register at the site control point immediately upon arrival. Only authorized visitors will be allowed access to the project work areas. Each visitor will be provided the necessary protective equipment for use during the visit and shall be escorted by the SHSO while near the contaminated areas.

Figure 9-1 presents the proposed work zone areas.


South
-2+00
-1+00
0+00
1+00
2+00
3+00
4+00
N
1 + 00
0 + 50
0 + 00
-0 + 50
Railroad Right-of-way
Fence
EXCLUSION ZONE
Railroad Right-of-way access
ASPHALT
Fence
EXCLUSION ZONE
Transformer yard
North Property Fence
CONTAMINATION
REDDUCTION ZONE
EAST BUILDING
EXCLUSION ZONE
South Property Fence
WEST BUILDING
COMMAND POST
EXCLUSION ZONE
NOTE:
Coordinate system established by Bechtel for this report.
0
50
100
SCALE IN FEET
BECHTEL NATIONAL, INC.
San Francisco
SITE LAYOUT
FIGURE 9-1
17282-001

9.2 DECONTAMINATION PROCEDURES

The SHSO will establish a decontamination station adjacent to the restricted area. The SHSO shall ensure that all workers use appropriate decontamination procedures and that decontamination equipment (detergent and rinse solutions, wash tubs, brushes and plastic bags) is available at the station. All personnel will be required to decontaminate their protective equipment prior to leaving the site.

After protective equipment is cleaned and removed, individuals shall thoroughly wash their hands and all exposed skin surfaces before taking a break to eat, drink, chew or smoke.

Personnel will decontaminate in the following manner:

1) Remove hard hat, wash, rinse, stack to dry.
2) Remove and discard booties (if wearing Tyvek).
3) Remove and scrub boots.
4) Remove outer gloves, wash, rinse, hang to dry.
5) Remove respirator, wash, rinse, hang to dry.
6) Remove and discard Tyvek suit.
7) Remove and discard inner gloves (if worn).
8) Wash hands, face, and neck.
9) Proceed into clean area.

Wash and rinse water shall be contained. The final disposition of the water will be determined after it has been analyzed.

After daily field work is completed, outer protective clothing will be removed and placed in plastic bags. If laundering is necessary, clothing will be washed by a laundry that accepts contaminated clothing. Disposable clothing will be disposed as directed by the SHSO. Boots will be decontaminated each day and left on-site until conclusion of project field work.

9.3 SAMPLING EQUIPMENT DECONTAMINATION

Sampling devices, tools and cleaning equipment used in the PCB site investigation shall be decontaminated using soap and water, pesticide grade hexane, and deionized water rinse. Decontamination shall be conducted outdoors and personnel conducting the decontamination work shall remain upwind of the work area to minimize inhalation of the hexane vapors.

Fire protection should be immediately available in case of a fire. An alcohol foam, dry chemical or carbon dioxide extinguisher is acceptable. Solvents may be absorbed in small quantities on paper towels and allowed to evaporate in a safe outdoor place.

9.4 EMERGENCY RESPONSE

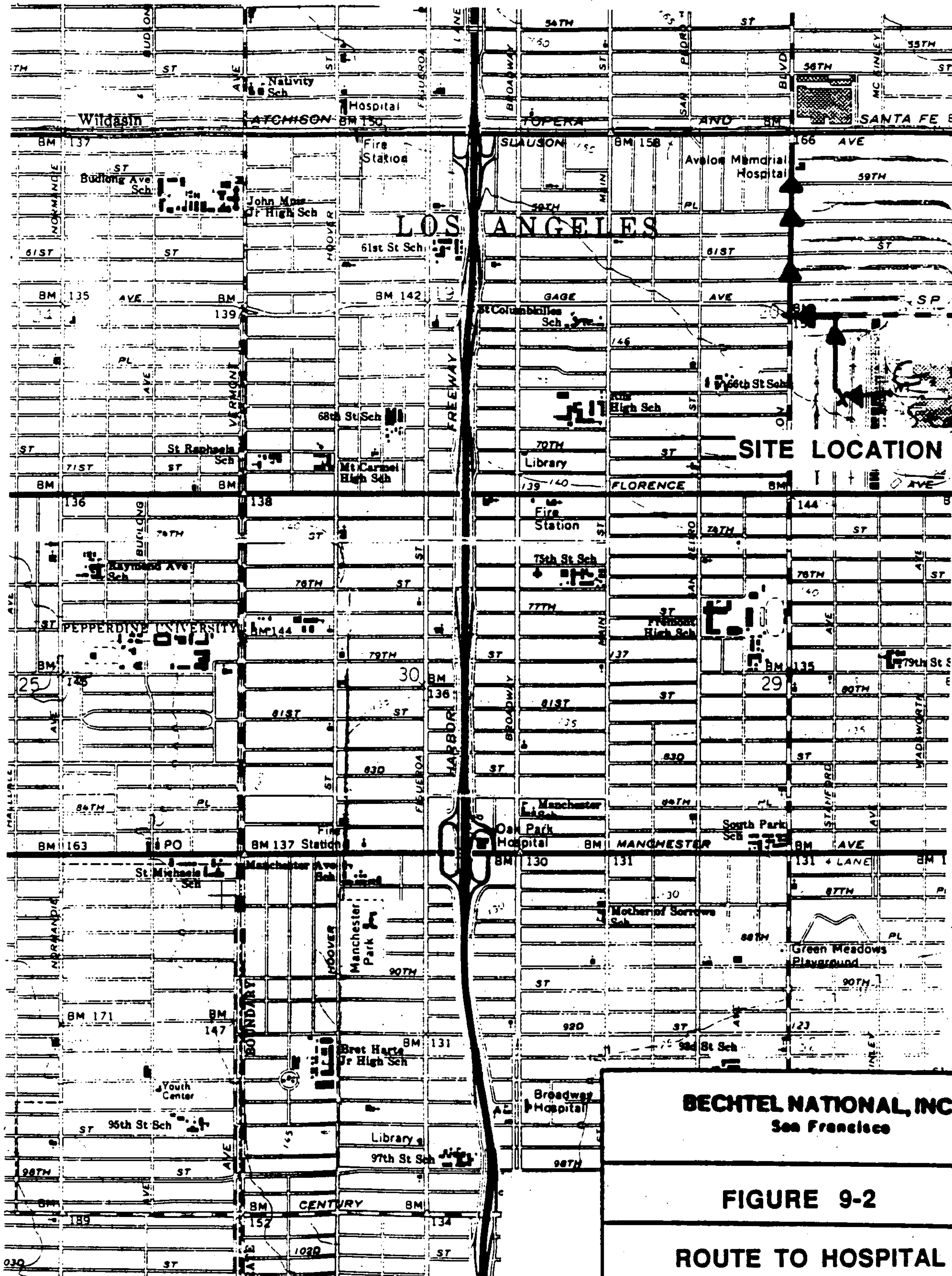
9.4.1 Planning

Prior to field activities, the SHSO shall plan emergency routes and discuss them with all personnel who will be conducting the field work.

Initial planning includes establishing the best means for evacuation from work areas in case of a catastrophe (e.g., explosion, fire, etc.).

9.4.2 Emergency Services

A tested system must exist for rapid and clear distress communication, preferably voice, from all on-site personnel to the SHSO. The SHSO shall ensure that methods to communicate with the local fire department, police, ambulance services, hospital facilities, and poison control centers are known by all personnel. All personnel shall be provided concise and clear directions and accessible personnel transportation to local emergency services. The nearest hospital is Avalon Memorial Hospital and is located at 5862 S. Avalon Blvd. Figure 9-2 is a map showing directions to the hospital.



BECHTEL NATIONAL, INC.
San Francisco

FIGURE 9-2

ROUTE TO HOSPITAL

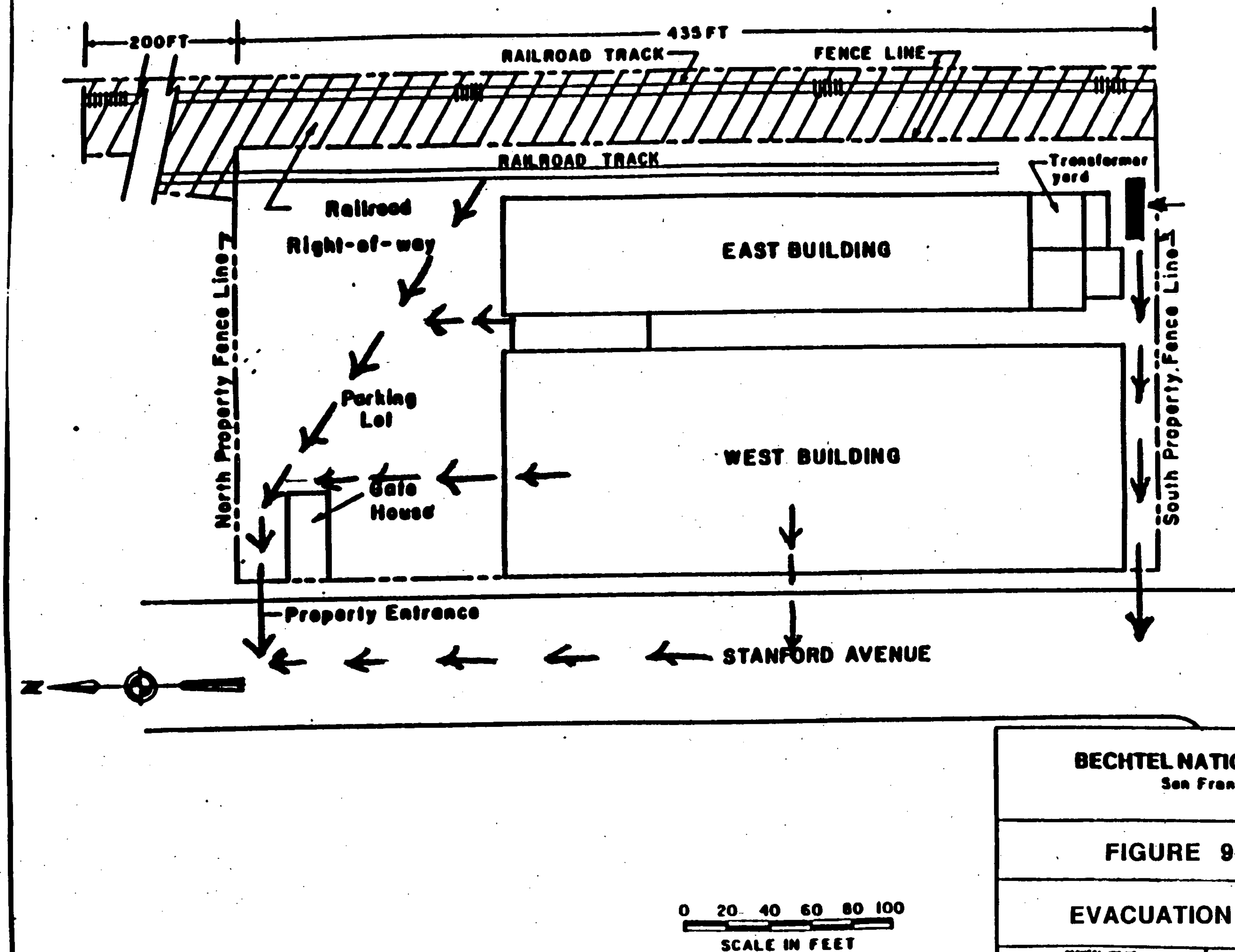
17282-001

9.4.3 Emergency Evacuation from Contaminated Areas

Any person requiring medical attention shall be evacuated promptly from any contaminated area. Personnel shall not enter an area to attempt a rescue if their own lives would be threatened because of inadequate personal protection available (e.g., oxygen deficient atmosphere and no self-contained breathing apparatus). The SHSO shall be responsible for evacuating any person from any work area which that person is allowed to enter. Special decontamination treatment or procedures for any injured person shall be provided. Evacuation shall occur if personal protective equipment fails. An evacuation route is presented in Figure 9-3.

9.4.4 First Aid

Qualified personnel only shall give first aid and stabilize an individual needing assistance. Life support techniques such as CPR and treatment of life-threatening problems such as bleeding, airway maintenance, and shock shall be given top priority. Professional medical assistance shall be obtained at the earliest possible opportunity.



BECHTEL NATIONAL, INC.
San Francisco

FIGURE 9-3

EVACUATION ROUTE

17282-001

9.4.5 Emergency Actions

If an emergency involving actual or suspected personal injury occurs, the SHSO shall follow these steps:

- Remove the exposed or injured person(s) from immediate danger.
- Render First Aid if necessary. Decontaminate affected personnel after critical first aid is given.
- Obtain paramedic services or ambulance transport to local hospital. This procedure shall be followed even if there is no visible injury.
- Other personnel in the work area shall be evacuated to a safe distance until the SHSO determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work shall not commence until all hazard control issues are resolved.
- At the earliest time practicable, the SHSO shall contact the Environmental Technology Manager and the Project Manager, or their designees, giving details of the incident, and the steps taken to prevent its recurrence.
- A written report of the incident shall be forwarded to the Environmental Technology Manager and the Project Manager, or their designees, within twenty-four (24) hours following the incident.

9.5 WORK PRACTICES

All investigation personnel and visitors shall follow the guidelines, rules and procedures listed below. In addition, the SHSO may impose any other procedures or prohibitions that he believes are necessary for safe operations.

- No one will be permitted to engage in excavation or sampling operations alone.
- Smoking, eating, drinking, chewing gum or tobacco, taking medication, and applying cosmetics will not be permitted within any restricted zone.
- Wearing contact lenses will not be allowed.
- No open flames will be permitted outside the clean area.
- Personnel should keep track of weather conditions and wind direction to the extent they could affect potential exposures.
- Personnel should practice contamination avoidance by avoiding unnecessary contact with contaminated areas and objects.

- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.

- Personnel should never ignore symptoms which could indicate potential exposure to chemical contaminants. These should be immediately reported to the SHSO.

10.0 STANDARD OPERATING PROCEDURES

There are certain standard procedures that will be routinely followed during the investigation activities. These procedures include:

- Communication
- Decontamination, and
- Respirator Fit Testing.

COMMUNICATION PROCEDURES

A horn blast will be the emergency signal to indicate that all personnel should leave the restricted area. The nearest telephone will be identified and pointed out to all field personnel in the event that emergency telephone calls must be made.

DECONTAMINATION PROCEDURES

After exiting the restricted aeras, personnel will decontaminate in the following manner:

1) Remove hard hat, wash, rinse, stack to dry.
2) Remove and discard booties (if wearing Tyvek).
3) Remove and scrub boots.
4) Remove outer gloves, wash, rinse, hang to dry.
5) Remove respirator, wash, rinse, hang to dry.
6) Remove and discard Tyvek suit.
7) Remove and discard inner gloves (if worn).
8) Wash hands, face, and neck.
9) Proceed into clean area.

Wash and rinse water shall be contained. The final disposition of the water will be determined after it has been analyzed.

RESPIRATOR FIT TESTING PROCEDURE

When employees test the facepiece-to-face seal of the respirator and wear it in a test atmosphere, the respirator head straps must be as comfortable as possible. These tests are then performed:

- <u>Negative Pressure Test.</u> This test can be done in the field. It consists of closing off the inlets of the canister, cartridge(s), or filter(s) by covering them with the palm of the hand, replacing the seals over the canister or cartridge inlets, or squeezing the breathing tubes so that air cannot pass. Then one inhales gently so the facepiece collapses slightly. The breath is held for ten seconds. If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough. This test may only be used as a very gross determination of fit.

- <u>Positive Pressure Test.</u> This test is conducted by closing off the exhalation valve and exhaling gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage. This test is easy and should be performed just before entering any hazardous atmosphere.

- <u>Banana Oil, Sucrose Water, or Irritant Smoke Test.</u> This test involves exposing the respirator wearer to one of the commercially available test kits. Fit-tests will be performed in accordance with manufacturer's instructions, the fitting test should be performed as follows:

  1. Put on the respirator in a normal manner, in an area that is not saturated with the material.

  2. Walk into the area with the test material.

  3. If you detect the test material, tighten the respirator without producing discomfort and repeat Step 2.

  4. Describe the smell/taste of the material.

During the test, the employee should make movements that approximate a normal working situation. These may include the following:

- Normal breathing

- Deep breathing, such as during a heavy exertion period (This should not be done long enough to cause hyperventilation.)

- Slowly perform side-to-side and up-and-down head movements (These movements should be exaggerated, but should approximate those that take place on the job.)

- Talking (This is most easily accomplished by reading a prepared text loudly enough to be understood by someone standing nearby.)

APPENDIX A-1

EMERGENCY TELEPHONE NUMBERS

Site Location: 6900 Stanford Avenue
Los Angeles, CA

Local Emergency Services

City Fire Department	911
Ambulance Service	911
Community Hospital	(213) 233-4341
Poison Control Center	(213) 484-5151

Toxic Hazard Information

TOXLINE	(301) 496-1131
CHEMTREC (24 hour)	(800) 424-9300

Emergency Contacts

National Response Center (24 hour)	(800) 424-8802
Environmental Protection Agency	(415) 973-5132

General Electric Contacts

John Harrsen	(518) 385-0045
Paul R. Christionsen	(818) 572-5184

Bechtel Contacts

Richard L. Morales Project Manager	(415) 768-0777
Christopher Valentino Site Health and Safety Officer	(415) 768-4054
Karl J. Leist, CIH Manager of Health and Safety	(415) 768-2382

STANDARD PROCEDURE FOR REPORTING EMERGENCIES

When calling for assistance in an emergency situation, the following information should be provided:

1. **Name of person making call.**
2. **Telephone number at location of person making call.**
3. **Name of person(s) exposed or injured.**
4. **Nature of emergency.**
5. **Actions already taken.**

APPENDIX A-3

RESPIRATORY PROTECTION PROGRAM

The purpose of this general respiratory protection program program is to protect employees from respiratory hazards and to comply with the OSHA Respiratory Protection Standard, 29 Code of Federal Regulations 1910.134 and ANSI Z88.2 - 1980.

Respirators are to be used only after it has been determined that engineering and administrative controls by themselves will not be effective or are not feasible. Since air-purifying type respirators may be used at the General Electric site, most program information addresses air-purifying rather than air supplying type respirators.

Administration of Responsibilities

The Site Health and Safety Officer and appropriate Subcontractor Safety Coordinator are responsible for coordinating the administration of this program. Effective administration includes the following:

- Work area surveillance to determine the type and concentrations of air contamination found on each construction site
- Respirator selection, using the guidelines set forth in this manual and manufactuers'recommendations
- Employee training in the proper use of the respirators
- Respirator fitting
- Respirator maintenance and cleaning procedures
- Purchasing procedures and inventory control
- Guidelines for emergency respirator use
- Medical surveillance of employees using respiratory protection devices
- Program evaluation

Associated records which must be maintained on site for proper surveillance and control of this program, then forwarded to permanent project files, are:

- Respirator Protection Education and Fit Testing Records (See Training Section)

- Respirator Care and Maintenance Record (next page)

Note: Retention of associated medical air monitoring, and training records are addressed in each respective section.

Work Area Surveillance

Work area conditions must be surveyed to determine the degree of employee exposure or stress. The surveillance should include the following:

- Identify substances that cause, or may cause, employees' overexposure
- Determine the estimated average exposure concentration that can be expected for 8 hours of normal work operations
- Determine whether feasible engineering controls are, or can be, provided to reduce or eliminate the exposure
- Determine the type of respirator required and for what part(s) of the operation it is to be used

The surveillance can be conducted by using direct reading detection tubes and other air sampling instruments. (see the Air Monitoring Section for details).

The protection factor (PF) must always be considered when selecting respiratory protection. The PF represents the efficiency of a respirator. The PF is calculated using:

$$\text{protection factor (PF)} = \frac{\text{ambient air concentration}}{\text{concentration inside facepiece or enclosure}}$$

Respirator Care and Maintenance Record

Jobsite Name: ______________________ Number: ____________________

Respirator Manufacturer and Number (Jobsite Identification Number if Assigned)	Maintenance Performed	Date Performed	Cleaned and Sanitized	Performed By	Other

RESPIRATOR CARE AND MAINTENANCE RECORD
(includes cartridge replacements)

It is recommended that when selecting respirators that manufacture supply the project with the PFs of each respirator they supply. The following is a condensed list of PFs:

Type of Respirator	Protection Factor
Air purifying	5
Single use dust	10
Half or quarter mark fume	10
Full facepiece, high efficiency	50
Supplied air	
Demand, half mask	10
Demand, full mask	50
Pressure demand, half mask	1,000
Pressure demand, full mask	2,000
Continuous flow, hood, helmet or suit	2,000
Self-contained breathing apparatus	
Open circuit, demand, full facepiece	50
Open circuit, pressure demand, full facepiece	10,000

To calculate the effectiveness of a given respirator the ambient containment concentration must be monitored. Once this is determined the monitored concentration must be weighed against the following:

PF x permissible exposure limit = maximum use concentration

Respirator use must be re-evaluated when process procedures or products are changed.

Medical Surveillance

No employee can be assigned work that requires the use of a respirator unless he or she is physically capable of doing the work. (If an employee is not required to use a respirator, but requests one, no medical evaluation is required.) As part of the medical surveillance program, employees will be assessed for respirator usage capabilities.

Selecting and Using a Respirator

The potential hazard exposure determines what kind of respirator is used. The following must be considered:

- What is the airborne contaminant concentration where the respirator will be used.
- What is the permissible exposure limit (PEL), threshold limit value (TLV), or short-term exposure limit (STEL) for the contaminant?
- Is the contaminant a gas, vapor, dust, or fume?
- Could the contaminant concentration be termed immediately dangerous to life or health?
- If the contaminant is flammable, does the estimated concentration approach the lower explosive limit, or do dust concentrations create a potential explosive problem?
- Does the contaminant have adequate warning properties, such as odor, irritation, or taste?
- Will the contaminant irritate the eyes at the estimated concentration?
- What type of respirator will give the required maximum protection?

Mechanical Filter Respirators

Mechanical filter respirators protect against aiborne particulate matter such as dust, mists, metal fumes, and smokes. Three styles of respirators are used: quarter masks with a single filter, half masks with a twin or single cartridge, and disposable units.

Mechanical filter respirators must not be used in environments immediately dangerous to life or health or in atmospheres containing less than 19.5 percent oxygen. High efficiency filter cartridges must be used when the employee is exposed to highly toxic particulate matter or to radionuclides. When working where eye irritation is a problem, a full facepiece unit must be used. Any approved filter respirator can be used for nuisance dust as long as the protection factor is not exceeded.

Do not use a more efficient respirator than necessary. For example, a fume-type cartridge for nuisance dust will clog up rapidly, thus lowering usage time.

Chemical Cartridge Respirators

Chemical cartridge respirators protect against low concentrations of organic vapors and gases, alkaline gases, acid gases, mercury vapors, pesticides, paint vapors and mists, organic vapors or gases combined with acid or alkaline gases. It also protects against any of these materials combined with dust, fumes, or mists.

Chemical cartridge respirators must not be used for exposures to air contaminants that cannot be easily detected by odor or irritation. For example, they must not be used to protect against methyl chloride or hydrogen sulfide. The former is odorless; the latter, while foul smelling, paralyzes the olfactory nerve so quickly that odor detection is unreliable. Chemical cartridge respirators must not be used for protection against gases that are not effectively stopped.

Do not use chemical cartridge respirators for the materials listed below. Instead use air line and supplied or special use respirators.

Name	Chemical Abstract Service Registry Number
Acrolein	107-02-8
Aniline	62-53-3
Arsine	7440-38-2
Bromine	314-40-9
Carbon Monoxide	630-08-0
Dimethylaniline	121-69-7
Dimethyl Sulfate	77-78-1
Hydrazine	302-01-2
Hydrogen Cyanide	74-90-8
Hydrogen Fluoride	7664-39-3
Hydrogen Selenide	7783-07-5
Hydrogen Sulfide	7783-06-4
Methanol	67-56-1
Methyl Bromide	74-83-9
Methyl Chloride (this is not M-6)	74-87-3
Methylene Biphenyl Isocyanate	101-68-8
Nickel Carbonyl	13463-39-3
Nitro Compounds:	
Nitrobenzene	98-95-3
Nitrogen Oxides	10024-97-2
Nitroglycerin	55-63-0
Nitromethane	75-52-5
Ozone	10028-15-6
Phosgene	75-44-5
Phosphine	3803-51-2
Phosphorus Trichloride	7719-12-2
Stilbene	7803-52-3
Sulfur Chloride	10025-67-9
Toluene Diisocynate	584-84-9
Vinyl Chloride	75-01-4

Never use cartridges after the expiration date printed on the label. All cartridge respirators must be inspected, cleaned, maintained, and stored in a sanitary manner.

Training

Selecting the appropriate respirator for a given hazard is important. Using it properly is equally important. Proper use is ensured by carefully training safety personnel, supervisors, and the employees in the selection, use, and maintenance of respirators. The training must include the following:

- Handling the respirator
- Demonstrations and practice in wearing, adjusting, and determining the fit of the respirator
- Testing of facepiece to face seal
- Wearing in normal air
- Wearing the respirator in a test atmosphere
- Discussions of the engineering and administrative controls in use and why respirators are needed
- Explanation of the nature of the respiratory hazard and what happens when the respirator is not used properly
- Explanation of why a particular type of respirator has been selected
- Discussion of how to recognize and handle emergencies

Supervisory Training

Supervisors must have a thorough knowledge of respirators and respiratory protection practices. Their training must include, but not necessarily be limited to:

- Basic respiratory protection practices
- Selection and use of respirators to protect employees against every hazard to which they may be exposed
- Nature and extent of the respirator hazards to which the employees may be exposed
- Legal requirements pertinent to the use of respirators
- Supervisor's responsibilities

Employee Instruction and Training

The extent and frequency of employee training depends primarily on the nature and extent of the hazard. If the hazard is a nuisance dust, for example, the danger from the nuisance dust is not likely to be serious. However, a single exposure to highly toxic substances may have serious consequences.

Because proper respirator use depends especially on the wearer's motivation, it is important that the need for the respirator be explained fully. Most respirator manufacturers have special written instructions and established respirator training programs that are available to their customers. The basic training program must include:

- Instructions in the nature of the hazard, whether acute, chronic, or both, and an honest appraisal of what may happen if the respirator is not used
- Discussion of why this is the proper type of respirator for a particular purpose
- Discussion of the respirator's capabilities and limitations
- Instruction, training, and actual use of the respirator (especially one for emergency use) and close, frequent supervision to ensure that it continues to be used properly
- Classroom and field training in recognizing and coping with emergencies
- Other special training, as required, depending on the exposure hazard

When employees test the facepiece-to-face seal of the respirator and wear it in a test atmosphere, the respirator head straps must be as comfortable as possible. These tests are then performed:

- Negative Pressure Test. This test can be done in the field. It consists of closing off the inlets of the canister, cartridge(s), or filter(s) by covering them with the palm of the hand, replacing the seals over the canister or cartridge inlets, or squeezing the breathing tubes so that air cannot pass. Then one inhales gently so the facepiece collapses slightly. The breath is held for ten seconds. If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough. This test may only be used as a very gross determination of fit.

- Positive Pressure Test. This test is conducted by closing off the exhalation valve and exhaling gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage. This test is easy and should be performed just before entering any hazardous atmosphere.

- Banana Oil, Sucrose Water, or Irritant Smoke Test. This test involves exposing the respirator wearer to one of the commercially available test kits. Irritant smoke fit-tests will be performed in accordance with manufacturer's instructions, the fitting test should be performed as follows:

    1. Put on the respirator in a normal manner, in an area that is not saturated with the material.
    2. Walk into the area with the test material.
    3. If you detect the test material, tighten the respirator without producing discomfort and repeat Step 2.
    4. Describe the smell/taste of the material.

During the test, the employee should make movements that approximate a normal working situation. These may include the following:

- Normal breathing

- Deep breathing, such as during a heavy exertion period (This should not be done long enough to cause hyperventilation.)

- Slowly perform side-to-side and up-and-down head movements (These movements should be exaggerated, but should approximate those that take place on the job.)

- Talking (This is most easily accomplished by reading a prepared text loudly enough to be understood by someone standing nearby.)

Self-Contained Breathing Apparatus

Self-contained breathing apparatus (SCBA) provide respirator protection in oxygen-deficient environments and where high or unknown concentrations of toxic gases, vapor(s), or particles are present. If SCBA's or other air supplied type respirators are necessary for field work, a special program and procedures must be implemented before use.

Respirator Assignment

Whenever practical, respirators should be assigned on an individual basis and marked with the employee's identification number:

- Approved Equipment. Respirator approval is granted by NIOSH/MSHA via test certification (TC) numbers. Sites should specify to vendors that only NIOSH/MSHA approved equipment will be accepted. All component and replacement parts must also have NIOSH/MSHA approval.

  In addition, respirators are approved as a system. Cartridges, canisters, filters, air lines, and regulators cannot be interchanged among equipment or even among equipment of a given manufacturer unless specifically approved by the manufacturer.

- Disposable Equipment. The use of disposable respiratory protection devices eliminates the need to clean, disinfect, inspect, and repair equipment. While the total cost of disposable equipment may, in some cases, be higher than comparable reusable devices, this cost may be offset by saving of labor and investment for cleaning, inspection, and storage facilities.

Special Use Problems

Every respirator wearer must receive respirator fitting instructions that include demonstrations and practice sessions. Respirators must not be worn if the face seal is not good because contaminated air could enter the facepiece. A good seal can be prevented by a beard, sideburns scars, hollow temples, excessively protruding checkbones, deep creases in facial skin, the absence of teeth or dentures, a skull cap that projects under the facepiece, or temple pieces on glasses. Even a few days' growth of beard will permit contaminants to enter. Therefore, employees with facial hair must not be permitted to wear respirators in life endangering environments, and are, therefore, eliminated from emergency response teams.

Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannot be established if the temple bars of eye glass extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head.

Maintenance and Cleaning

Respirator maintenance must be an integral part of the overall respirator program. Wearing a poorly maintained or malfunctioning respirator is more dangerous than not wearing a respirator at all. They are particularly vulnerable to poor maintenance because (1) they are used infrequently, and (2) they are used in the most hazardous and demanding circumstances.

Inspection Procedures and Repair

Inspection for defects in respiratory equipment shall be completed before and after each use and during cleaning. Common defects and the appropriate corrective actions are itemized below:

Air Purifying Respirators (quarter-mask, half-mask. and full mask)

- Rubber facepiece - check for:
  - excessive dirt (clean all dirt from facepiece),
  - cracks, tears, or holes (obtain new facepiece),
  - distortion (allow facepiece to "sit" free from any constraints and see if distortion disappears; if not, obtain new facepiece), and
  - cracked, scratched, or loose fitting lenses (contact respirator manufacturer to see if replacement is possible; otherwise obtain new facepiece).
- Headstraps - check for:
  - breaks or tears (replace headstraps),
  - loss of elasticity (replace headstraps), and
  - broken or malfunctioning buckles or attachments (obtain new buckles).

- Inhalation valve, exhalation valve - check for:
  - detergent residue, dust particles, or dirt on valve or valve seat (clean off with soap and water),
  - cracks, tears, or distortion in the valve material or valve seat (obtain new part or contact manufacturer for instructions), and
  - missing or defective valve cover (obtain replacement valve cover from manufacturer).
- Filter elements(s) - check for:
  - proper filter for the hazard
  - approval designation.
  - missing or worn gaskets (contact manufacturer for replacement),
  - worn threads - both filter threads and facepiece threads (replace filter or facepiece, whichever is applicable), and
  - cracks in filter housing (replace filter).

If defects are found during any field inspection, two remedies are possible. If the defect is minor, repair or adjustment may be made on the spot. If it is major, the device should be removed from service for repair. Under no circumstances should a defective device remain in the field. Respirator cleaning usually involves some disassembly, so it presents a good opportunity to examine each respirator thoroughly for defects.

Cleaning and Disinfecting

Routinely used respirators must be collected, cleaned, and disinfected as frequently as necessary.

The actual cleaning may be done in a variety of ways. Any good detergent may be used, following by a disinfecting rinse or a combination disinfectant/detergent for a one-step operation.

To avoid damaging the rubber and plastic in the respirator facepieces, the cleaning water should be between 120°F to 140°F.

To prevent dermatitis, the cleaned and disinfected respirator should be rinsed thoroughly in water to remove all traces of detergent and disinfectant.

The respirator may be allowed to dry in room air (free of dust) on a clean surface. It may also be hung from a horizontal wire, like drying clothes, but care must be taken not to damage or distort the facepiece.

Storage

Respirators must be stored to protect against the following:

- Dust
- Sunlight
- Heat
- Extreme cold
- Excessive moisture
- Damaging chemicals
- Mechanical damage

Freshly cleaned respirators should be placed in heat-sealed or sealed plastic bags until re-issue. They should be stored in a clean, dry locations away from direct sunlight, and placed in a single layer with the facepiece and exhalation valve in an undistorted position. This prevents rubber or plastic from being a permanent distorted "set."

Although disposal respirators do not have to be cleaned or disinfected, they should always be stored in the manner described above when not in use.

APPENDIX D

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR THE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT THE

GE STANFORD AVENUE FACILITY

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared by Bechtel Environmental, Inc. (BEI) to direct the performance of the Remedial Site Investigation/Feasibility Study (RI/FS) for the former GE Apparatus Servicing Shop in Los Angeles, California. The purpose of the RI/FS is to determine the magnitude and extent of the PCB contamination that occurred during the 25 years of operation of the facility and to identify and evaluate site remedial actions, if necessary.

Section 1.0 of the overall work plan presents a detailed description of the project background and site history. The project scope and schedule are also discussed in this work plan. All tasks described and performed are a result of the work plan and will be in accordance with applicable laws, regulations and rules.

Section 2

QUALITY ASSURANCE OBJECTIVES

The overall objective of this QAPP is to ensure that data are collected which are precise, accurate, complete, comparable and representative of actual site conditions. EPA's January 1986 Draft Supplement to QAMS-005/80 defines accuracy, precision, completeness, comparability and representativeness as follows:

> <u>Accuracy</u> - the degree of agreement of a measurement with an accepted reference or true value.
>
> <u>Precision</u> - a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Usually expressed in terms of the standard deviation.
>
> <u>Completeness</u> - the amount of valid data obtained from a measurement system compared to the amount that was expected and needed to be obtained to meet the project data goals.
>
> <u>Comparability</u> - expresses the confidence with which one data set can be compared to another.
>
> <u>Representativeness</u> - refers to a sample or group of samples that reflects the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

Accuracy, precision and completeness goals for the major chemical analyses to be performed on samples collected at the GE Stanford Avenue Site are presented in Table 2-1. The actual precision and accuracy of the chemical data collected will be calculated at the conclusion of each phase of field work. The results of precision and accuracy calculations will be presented in interim reports prepared for each phase of field work (except the final phase prior to preparation of the RI report) and in the RI report. If data do not meet the goals prescribed in Table 2-1, they may be retained, but will be so noted in the appropriate reports. The precision of data reported at or near

Table 2-1

ANALYTICAL QA OBJECTIVES

Measurement Parameter	Method	Reference	Precision (RPD)	Accuracy (Percent)	Completeness (Percent)
I. Polychlorinated BiPhenyls					
Water	EPA 608	EPA 600/4-82-057	10	85-115	100
Soil	EPA 8080	EPA SW-846	25	25-140	100

detection limits may in many cases be low (i.e., RPD in excess of Table 2-1 goals), even though the data may be completely acceptable. (As an example, duplicate values of 0.1 ppb and 1 ppb result in an apparently "unacceptable" RPD of 164 percent.) Therefore, the precision goals in Table 2-1 are stated as appropriate for results at least 10 times greater than detection limits.

A discussion of QA/QC samples to be analyzed is presented in Section 10. Procedures for assessing accuracy, precision and completeness are presented in Section 11.

The comparability of all data will be assisted by reporting each data type in consistent units. All depths, distances, elevations, etc. will be reported in English units. Chemical data will be reported in parts per billion (mg/l) for water samples, parts per million (mg/kg) for soil samples and mg/m^3 for air samples.

The representativeness of data will be ensured by the use of established field and laboratory procedures and their consistent application. These procedures are discussed in later sections of the QAPP.

Section 3

SAMPLING PROCEDURES

This section describes the procedures to be used in collecting soil and water samples. The procedures are designed to ensure that samples are consistently collected, labeled, preserved and transported in a manner which maintains their integrity for their intended purposes. Samples to be collected include:

- Soil samples for PCB analysis.
- Ground-water samples for PCB analysis.
- Dust samples for PCB analysis.
- Wall scraping for PCB analysis.

All samples will be handled in accordance with the chain-of-custody guidelines outlined in Section 6. All samples collected for PCB analysis will be collected in the sample containers and shipped promptly to the laboratory. Samples will be preserved in the field as appropriate for the analysis to be performed and will be analyzed within EPA holding times established for the analysis to be performed. (The extraction time for PCB is 10 days for soil samples and 7 days for waters samples. The holding time for PCB is 40 days after extraction.) Exceptions to holding time requirements for some soil samples may be proposed in RI/FS sampling plans which outline the specific locations and number of samples to be collected and the parameters for which the samples will be analyzed.

Samples will be shipped to the laboratory within two to three days of sample collection. If large numbers of samples are collected in a single day (e.g., soil samples), samples will be shipped at the end of the day on which they are collected. If only a small number of samples (e.g., fewer containers than might fill a cooler) are collected on a given day, as is often the case with ground-water samples, samples may be retained in the field until more samples have been collected. In any case, samples will be cooled to approximately 4°C from the time of collection through transport of the samples to the laboratory and will not be retained in the field so long as to jeopardize prescribed holding times for the analyses to be performed. Any exceptions to holding times will be discussed for specific samples in project sampling plans.

Pre-cleaned sample containers will be supplied by the laboratory. Containers will be pre-cleaned as follows:

<u>Amber Glass Bottles and Wide Mouth Clear Glass Jars</u>

1. Wash containers, closures and teflon liners in hot tap water with laboratory grade non-phosphate detergent.

2. Rinse three times with tap water.

3. Rinse one time with 1:1 nitric acid.

4. Rinse three times with ASTM Type 1 deionized water.

5. Rinse one time with pesticide grade methylene chloride.

6. Oven Dry.

7. Remove containers, closures, and teflon liners from oven.

8. Place teflon liners in closures and place closures on container. Attendant to wear gloves and containers not to be removed from preparation room until sealed.

3.1 COLLECTION OF SOIL SAMPLES

Soil samples will be collected for PCB analysis.

Soil samples will be collected using a 5" hand augur. Soil samples for PCB analysis will be collected using the following procedures:

- Samples will be collected from the hand augur using a pre-cleaned stainless steel trowel, and transferred directly to wide mouth glass jars.
- Jars will be labeled as described in Section 6.
- Sample containers will be sealed with strapping tape.

- Containers will be placed in plastic bags, wrapped with padding material and stored in ice-filled coolers for transport to the laboratory

All the samples for laboratory analysis will be logged into the field notebook, and onto chain-of-custody forms. When coolers are ready for shipment to the laboratory, two copies of the chain-of-custody form will be placed inside a ziplock bag and taped with strapping tape to the inside of the coolers. Coolers will be sealed with duct tape.

Sample Collection

All measuring and sampling equipment will be decontaminated before introduction into a well as described in Section 4. Water levels will be measured before sampling. (See Section 5 for procedure.) The wells will then be purged using a teflon or stainless steel bailer or a bladder or peristaltic pump. During purging, indicator parameters (pH, conductivity and temperature) will be monitored to verify that the water to be sampled is representative of ground water from the formation. Samples will not be collected before a minimum of three casing volumes is removed from these wells. In the unlikely event that a well is pumped dry during purging, a minimum of two well volumes will be removed prior to sampling. Purged water will be collected in drums and stored temporarily on site. The final disposition of the water will be determined when analytical results for the water samples are available. Following purging, samples will be collected with a teflon or stainless steel bailer and transferred directly to appropriate sample containers.

Details of the sampling procedure followed at each well will be entered in a field notebook. The following information will be recorded at the time of sampling:

- Sampler's name
- Date and time of sample collection
- Well identification
- Depth to ground water prior to sampling

- Weather conditions
- Purging method and equipment
- Purged volume; note if volume limited by low well yield
- Measurements of indicator parameters (e.g., temperature, specific conductance, pH)
- Water appearance and odor
- Sampling method and equipment
- Sample number
- Volume and type of sample containers used
- Field treatment or preservatives

Ground-water samples will be collected using the following procedures:

- Samples will be transferred from the stainless steel bailer directly to the appropriate sample containers using a bottom emptying device. (The types of containers and volume of water to be collected for each analysis type are described in Table 3-1.)
- All water samples will be collected with no or minimal entrainment of air. To accomplish this, sample jars will be filled to overflowing, and caps will be slid into place.
- Containers will be labeled as described in Section 6.
- Sample containers will be sealed with strapping tape.
- Containers will be placed in coolers with packing material for transport to the laboratory for testing.
- Field notes will be recorded in ink in appropriate log books
- Chain-of-custody records will be filled out as described in Section 6 of this plan
- Coolers will be labeled and sealed as described for soil samples in Section 6 of this plan.

3.3 COLLECTION OF DUST PARTICLES

The surfaced areas surrounding the buildings will be sampled by collecting dust particles. The concrete surface behind the east building will be divided in six, fifty foot long sampling areas. Five to six samples will be collected from each area and composited prior to analyses. Dust samples for PCB analyses will be collected using the following procedure:

- The sample areas will be delineated
- A small brush and dust pan will be used to sweep the dust into small piles
- Samples will then be collected using a pre-cleaned stainless steel towel and transferred directly to the wide mouth glass jars
- Jar will be labeled as described in Section 6
- Sample container will be sealed with tape and placed in plastic bags
- Wrap sample container will then be placed into an ice-filled cooler for transport to the laboratory

Documentation of the sampling procedure as well as necessary information described in Section 3.2 will be recorded in the site sampling lab notebook.

3.4 COLLECTION OF SAMPLES FOR THE INTERIOR WALLS

Samples of the interior walls is necessary to identify any areas where PCBs may be present. The building walls are constructed of brick. The previously sampled wall will be core sampled in three locations adjacent to the previous wall boring by Brown and Caldwell. Each sample will be analyzed for the presence of PCBs.

Wall samples will be collected in the following manner:

- A high speed drill with a 1" bit will core into the brick wall.
- Each core will be collected and sent to a state approved analytical laboratory for analysis. Initially a surface portion will be analyzed to determine the presence or absence of PCB's contamination.
- Individual samples will then be cataloged and sent to the laboratory to be archived pending the results of the composite analysis. All sample containers will be labeled and sealed as discussed in Section 3.2.

Decontamination of the equipment (drill bit) will be performed between each sampling activity as described in Section 4.

3.5 COLLECTION OF SURFACE WATER RUN-OFF SAMPLES

There is no surface water on the facility. However, there may be the potential for contaminated soil to be carried off site in the run-off during a heavy storm event. Therefore, three surface water samples will be taken after a storm event that is large enough to produce measurable run-off.

Surface water samples will be taken using the following procedures:

- A pre-cleaned 1000 ml syringe will be used to collect samples from low lying areas or depression or outlined in the work plan
- Samples will then be transferred to liter amber bottles as outlined in the groundwater collection procedure in 3.2.

All documentation and procedures outlined in Section 3.2 will be followed for the surface water collection.

Section 4

DECONTAMINATION PROCEDURES

All equipment that comes into contact with potentially contaminated soil or water will be decontaminated prior to and after each use. Equipment will be decontaminated on pallets or plastic sheeting, and clean equipment will be stored on clean plastic sheeting in uncontaminated areas. Materials to be stored more than a few hours will also be covered.

- The trowel, hand augur, used to take soil samples, dust samples and wall samples will be cleaned between samples as follows:

  - Non-phosphate detergent wash
  - Tap water rinse
  - Pesticide-grade hexane rinse
  - Isopropanol rinse
  - Distilled water rinse (several)

- All casing, screen, couplings and caps used in monitoring well installation will be steam cleaned prior to installation. Visible foreign matter will be removed with a brush.

- The teflon or stainless steel bailer and the sampling syringe used for collection of the ground-water samples will be cleaned at the start of the job and between wells as follows:

  - Non-phosphate detergent wash
  - Tap water rinse (several)
  - Pesticide-grade hexane rinse
  - Isopropanol rinse
  - Distilled water rinse (several)

- Steel tapes, water probes, transducers, thermometer and water quality meters will be rinsed in distilled water or cleaned in a detergent solution and rinsed once in fresh water after each use.

Section 5

SAMPLE CUSTODY

Sample custody procedures will be followed through sample collection, transfer, analysis and disposal to ensure that the integrity of samples is maintained. All samples will be collected in accord with EPA chain-of-custody guidelines as prescribed in EPA NEIC Policies and Procedures, National Enforcement Investigations Center, Denver, Colorado, Revised 1984. Field sampling personnel will maintain field logbooks which contain at least the following information:

- Sample identification numbers
- Sample collection dates and approximate times
- Sample matrix
- Sample location and depth
- Sample appearance
- Sample field measurements (if applicable)
- Sample preservatives (if applicable)
- Type of sampling equipment used
- Type and number of sample containers
- Sampler's name

A sample label will be affixed to each individual sample collected. The following information will be recorded on each label:

- Project name and location
- Project number
- Date
- Sampler's initials
- Sample identification number

Chain-of-custody will be maintained using a multi-ply version of the chain-of-custody form included in the Appendix. Field personnel will log individual samples onto these forms when samples are collected, indicating sample identification numbers, matrices, time of collection and preservative added. The forms will accompany the samples from the field to the laboratory. Whenever a transfer of custody takes place, both parties will sign and date the accompanying chain-of-custody forms, and the individual relinquishing the samples will retain a copy of each form. The laboratory will attach copies of the completed chain-of-custody forms to the analytical reports prepared for the samples.

Analytical instructions will be submitted to the laboratory via letter. The instructions will reference sample identification numbers exactly as they appear on sample labels and chain-of-custody forms, and will indicate the samples to be analyzed, the analyses to be performed and the corresponding number and type (e.g., duplicate, spike) of quality control samples to be analyzed.

A designated sample custodian will take custody of all samples upon their arrival at the laboratory. The custodian will inspect all sample labels and custody forms to ensure that the information on each corresponds. The custodian will also inspect all samples for signs of damage or tampering. Any discrepancies in information or signs of damage or tampering will be documented by the custodian. The custodian will then assign a unique laboratory number to each sample and distribute the samples to the appropriate analysts or secured storage areas. All sample transfers in the laboratory will be recorded.

Laboratory personnel will be responsible for the care and custody of samples from the time of their receipt at the laboratory through their exhaustion or disposal. The laboratory will retain all written records of laboratory handling and analysis as part of a permanent laboratory file.

Section 6

ANALYTICAL PROCEDURES

The analytical methods to be used on samples collected from the Stanford Avenue site are summarized in Table 6-1. The table specifies method types, method numbers (if available) and method detection limit ranges. Actual detection limits obtained during analysis will be reported for each parameter in each sample. Highly contaminated samples or samples containing interfering substances may result in elevated detection limits.

The laboratory performing the analyses will have an established QA/QC plan, will be certified by the State of California for hazardous waste testing, and will be currently participating in EPA's Contract Laboratory Program (CLP). All analyses will be performed in accord with the laboratory's QA/QC plan as well as in accordance with appropriate analytical methods.

Table 6-1

ANALYTICAL METHODS

Parameter	Method No.	Method	Method Detection Limits(a) (ppb)
PCBs	EPA 608/8080	GC-EC	0.005-1.0/10-2,000

(a) Numbers left of slashes are method detection limits for water samples in ug/l; numbers to the right of slashes are limits for soil samples in ug/kg. Ranges indicate that detection limits may vary for different parameters detected by the same method. In some cases, detection limits may be elevated due to interferences or the presence of a parameter(s) at levels greater than five to 10 times the method detection limits specified in this table. Actual detection limits achieved will be reported by the laboratory.

Section 7

DATA REDUCTION, VALIDATION AND REPORTING

Data collected during the Stanford Avenue RI will be appropriately identified and validated, and included in interim phase reports and/or the RI report. Where test data have been reduced, the method of reduction will be described in the text of such reports. Entry of any data to computer data bases will be checked by cross reading hard copy data files with the data in its original form.

7.1 FIELD MEASUREMENT DATA

Validation of data obtained from field measurements will be performed by the task leaders or their designees. Validation of RI data will be performed by checking procedures utilized in the field and comparing the data to similar, previous measurements when they exist. If there are data which cannot be validated, the reason will be documented.

The following reporting requirements will be followed for field data:

- Soil sample depths: Tape measurements will be made to the nearest 0.1 feet; measurement made by known lengths of drill string will be made to the nearest 0.5 feet.
- Elevations of sampling sites:
  - Measuring points for all new monitoring wells and unsurveyed existing wells will be surveyed to the nearest 0.01 foot and referenced to Mean Sea Level.
  - Approximate elevations of all other nonsurveyed sampling sites will be determined to the nearest 1.0 foot.
- Locations of sampling sites: Locations of monitoring wells will be surveyed to the nearest 1.0 foot.

7.2 LABORATORY ANALYTICAL DATA

Calculations performed by the laboratory for reporting chemical concentrations will be performed according to the procedures specified in the referenced method of analysis listed in Table 8-1. (See Section 8.)

Validation of analytical data will be performed by senior chemists at the laboratory and by the Sampling and Analysis Task Leader or his/her designee. The data validation process will include implementation of specific procedures for evaluating and/or calculating the precision, accuracy and completeness of the chemical data. These procedures for data validation are discussed in Section 13. The results of the evaluations/calculations will be compared with the QA objectives discussed in Section 2.

Should poor laboratory performance be indicated by the precision or accuracy evaluations or from detected concentrations in field blank samples, the Sampling and Analysis Task Leader will notify the laboratory, and the laboratory will initiate appropriate corrective actions.

Section 8

QUALITY CONTROL CHECKS

Both field and laboratory quality control (QC) checks will be employed to evaluate the performance of laboratory analytical procedures. QC checks will take the form of samples introduced into the analytical stream to enable evaluation of analytical accuracy and precision.

8.1 FIELD QUALITY CONTROL CHECKS

Field QC checks will consist of blind submission of blank, duplicate and background samples to the laboratory. The nature and frequency of these samples are described below.

Duplicates

Given the heterogeneity of soils, and thus the questionable significance of a field soil duplicate, field soil duplicates will not be collected. (Duplicate soil samples will be prepared in the laboratory as stated in Section 10.2.)

Background Samples

To obtain background soils chemical data with which to compare the chemical data for samples collected in the railroad track area, two surface to six-inch deep samples will be collected. One will be collected from the north portion of the property outside the fenced area. The second sample will be collected south of the southeast corner of the fenced area. These areas are believed to be unaffected by former plant activities. The background samples will be analyzed for the parameters listed in Table 6-2.

8.2 LABORATORY QUALITY CONTROL CHECKS

Laboratory QC checks will include the following:

- Calibration of instruments as described in and at the frequency prescribed in the analytical methods used and in instrument manufacturers' instructions
- Analysis of standards for each analytical method to be performed at the start of each laboratory shift
- Analysis of one laboratory blank by each analytical method for every 10 samples analyzed, or one per batch, whichever is greater
- Analysis of one spike sample for every 20 samples analyzed, or one per batch, whichever is greater; spike samples will be spiked with representative compounds for each analytical method performed
- Analysis of one duplicate sample for every 20 samples analyzed, or one per batch, whichever is greater

Any spike or duplicate results which fall outside warning or control limits established on laboratory control charts will be reported in writing with all corresponding analytical data.

Section 9

AUDITS

During the remedial investigation, a system audit of the field and analytical programs will be performed by the Project QA Supervisor or his designee. If additional phases of well installation and/or sampling and analysis are performed, additional audits may be scheduled, the frequency of which will depend on the number of additional phases planned. Audits will be performed as early in the field and analytical programs as is reasonably possible to ensure that any developing problems are identified at the earliest possible time. The results of all field and analytical audits will be briefly discussed in the RI report.

The audits will be performed by the Project QA officer or his qualified designee. The field audits will focus on adherence to procedures outlined in this QAPP. The drilling and well installation audit will include field observation of drilling and well installation and inspection of selected drilling and well installation documentation. The sampling and analysis audits will include field observation of sampling procedures, selected documentation (e.g., chain-of-custody forms) and review of QC data for chemical analyses.

Performance audits will focus on the laboratory analytical program. The laboratory is a CLP laboratory and regularly participates in CLP performance evaluation checks. The laboratory has also successfully completed analysis of samples submitted by the California Department of Health Services hazardous waste certification program. Many of the pesticide parameters to be analyzed are compounds that are analyzed relatively infrequently by commercial laboratories. Development of a performance check program for these compounds for this singular project is not merited. Other QA/QC measures such as the inclusions of spikes and duplicates in the analytical program are considered sufficient to generate reliable, reproducible data.

Section 10

PREVENTIVE MAINTENANCE

All equipment will receive routine maintenance checks in order to minimize equipment breakdowns in the field. Maintenance checks will generally coincide with calibration checks. Any equipment found to be operating improperly will be taken out of use, and a note stating the time and date of this action will be made in a field logbook. The equipment will be repaired, replaced or recalibrated, as necessary, and the time and date of its return to service will also be recorded.

Section 11

STATISTICAL ASSESSMENTS OF DATA QUALITY

This section is a summary of procedures for assessing the validity of the chemical data derived from the analytical program. The data validation procedures will be used for statistically assessing duplicate and spike samples and for checking blank samples that are submitted blind to the analytical laboratories from the field or generated internally by the laboratory. The purpose for implementing these procedures is to verify that the chemical data generated during the RI are accurate, precise, complete, and therefore representative of site conditions.

Chemical data derived from the RI will be evaluated in terms of accuracy, precision, and completeness. A combination of statistical procedures and qualitative evaluations will be used to check the quality of the data. Complex statistical data verification and significance evaluation will, however, not be performed, and data will not be removed from the data base based on statistical evaluations. If the quality of any data is questionable, the data will be annotated in appropriate phase reports and in the RI report. If, for example, chemical results on samples from one well differ by 100 to 200 percent at one to two orders of magnitude above the analytical method detection limit, the well would likely be extensively redeveloped and re-sampled.

The assessment procedures in this section are designed to review QC data for the three QC sample types, described earlier in Section 10: spikes, blanks and duplicates. The procedures are presented below and are designed for evaluating both field and laboratory data.

11.1 SPIKES

The procedure for assessing spike samples will be as follows:

1. Tabulate spike sample data and calculate the percent recovery as shown below for each sample:

   $$\text{percent recovery} = \frac{(T - X)}{A} \times 100\%$$

   where: T = total concentration found in spiked sample
   X = original concentration in sample prior to spiking
   A = actual spike concentration added to sample

2. Calculate the average and standard deviation of the percent recoveries for each analytical category in each matrix (e.g., soil, water)

3. Identify those samples that exceed the recovery limits stated in Section 2.

4. Qualitatively evaluate the significance of data that fall outside the recovery limits. If data fall outside the limits, the data from that period of time will be reevaluated for the compound that did not meet the limits. Poor data will not be removed from the data base, but may result in the qualification of interpretations which rely on these data.

11.2 BLANKS

The evaluation procedure for blanks will be a qualitative review of the chemical analysis data reported by the laboratories. The procedure for assessing blank samples will be as follows:

1. Tabulate the data from the blank samples. A separate table will be prepared for both field and laboratory blanks

2. Identify any blank samples in which chemicals are detected.

3. If chemicals are not detected in any of the blank samples, their absence will be so stated in the appropriate interim phase reports and in the RI report

4. If chemicals are detected in blank samples, the laboratory will be asked to review other recent blank samples results to determine whether or not the finding is an isolated incident. Depending on the significance of the problem, additional blank samples may be submitted to the laboratory to verify that a problem exists and/or to determine that is has been corrected.

5. If any chemicals are found in blank samples, the compound(s) and concentration(s) will be reported, and the data for that period of time will be assessed for potential misinterpretation. Data will not be removed from the data base based on the detection of chemicals in blank samples. Appropriate notations will, however, be made in the appropriate reports.

11.3 DUPLICATES

The procedure for assessing duplicate samples will be as follows:

1. Tabulate duplicate data and calculate the relative percent difference (RPD) and percent ratio as shown below for each duplicate pair:

$$RPD = \frac{(X_1 - X_2)}{X} \times 100\%$$

where: X_1 = concentration for sample 1 of duplicate pair
X_2 = concentration for sample 2 of duplicate pair
X = average of sample 1 and 2

$$\text{percent ratio} = \frac{X_1}{X_2} \times 100\%$$

2. Calculate the average RPD for all duplicate pairs.

3. Calculate the standard deviation of the RPD's using the formula shown below:

$$s = \left(\frac{\div (x-\bar{x})^2}{n-1} \right)^{1/2}$$

where s = standard deviation
n = number of observed or calculated values
x = individual observed or calculated value
$\bar{x}$ = average of all observed or calculated values

4. Compare the RPD's with the precision objectives in Section 2.

5. Identify any duplicates that do not meet the precision objectives.

6. Calculate the percent ratio for the duplicates. Identify any duplicate pairs that have a percent ratio less than 15 percent and compare with samples that do not meet the precision objectives. 15 percent is an arbitrary cutoff that provides an independent check on the statistics for the duplicates. (RPD data may be distributed in an area worse than the 15 percent cutoff.)

   Data evaluation will focus on the precision objectives unless the 15 percent check indicates that RPD data consistently indicate poor duplicate results.

7. Qualitatively evaluate the significance of data that fall outside the precision objectives. If precision is deemed poor, the laboratory will be notified for appropriate corrective action. (See Section 14.)

11.4 CONTROL CHARTS

QC data generated from analysis of laboratory-prepared spikes and duplicates will be plotted on laboratory control charts. Any data which fall outside warning or control limits established in the laboratory will be noted in the laboratory analytical reports.

Section 12

CORRECTIVE ACTIONS

If it appears that field or laboratory data are in error, the error(s) or potential error(s) will be documented and appropriate corrective action(s) will be taken. Corrective actions may include one or more of the following:

- Measurements may be repeated to check the error.
- Calibrations may be checked and/or repeated.
- Instrument or measuring device(s) may be replaced or repaired.
- New samples may be collected, and/or samples may be reanalyzed.

Appropriate corrective actions will be determined on a case by case basis. A discussion of any corrective actions taken will be included in the appropriate interim or final RI reports.

As indicated in Section 3, the QA supervisor will be responsible for identification of problems and implementation of corrective actions. If the project manager, task leaders or project staff become aware of any problems in sample collection or analysis they will immediately notify the QA supervisor who will decide the appropriate action to be taken to correct the problem. Section 11 describes the system audits that will be performed by the QA supervisor or his designee to monitor sampling and analytical programs. These audits will be performed as early as possible to ensure that developing problems are identified and corrected at the earliest possible time.

Section 13

QUALITY ASSURANCE/QUALITY CONTROL REPORTS

The results of QA/QC audits and assessments will be summarized in appropriate interim reports and in the final RI report. The final RI report will include a separate QA section which provides an overall assessment of the performance of the field and laboratory programs based on the audits described in Section 11.

Appendix A

SAMPLE FORMS

BECHTEL

GEOLOGIC DRILL LOG

WATER PRESSURE TESTS

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

SAMPLE

WELL DEVELOPMENT

PROJECT		WELL NO
JOB NO.	SITE	PREPARED BY

METHOD

PUMP ____________

BAILER ____________

GAS ____________

OTHER ____________

DEVELOPMENT CRITERIA

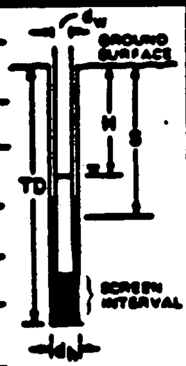
REMARKS

HOLE DIAMETER d_h = ______

WELL CASING
INSIDE DIAMETER $d_w ID$ = ______
OUTSIDE DIAMETER $d_w OD$ = ______

DEPTH TO:
WATER LEVEL H = ______
BASE OF SEAL S = ______
BASE OF WELL TD = ______

EST. FILTER PACK POROSITY P = ______



WELL VOLUME CALCULATION.

CASING VOLUME $= V_c = \pi \left(\frac{d_w ID}{2}\right)^2 (TD - H) = 3.14 \left(\frac{\quad}{2}\right)^2 (\quad - \quad) =$ ______

FILTER PACK PORE VOLUME $= V_f = \pi \left[\left(\frac{d_h}{2}\right)^2 - \left(\frac{d_w OD}{2}\right)^2\right] (TD - (S \text{ or } H)^*) (P) =$

(* If $S > H$ use S, if $S < H$ use H.)

$3.14 \left[\left(\frac{\quad}{2}\right)^2 - \left(\frac{\quad}{2}\right)^2\right] (\quad - \quad)(\quad) =$ ______

TOTAL WELL VOLUME $= V_T = V_f + V_c = \quad + \quad =$ ______ $ft^3 \times 7.48 =$ ______ gal.

DEVELOPMENT LOG

DATE	TIME BEGUN	TIME FINISH	METHOD	WATER REMOVED	CUMULATIVE TOTAL REMOVED GAL/LITERS	CUMULATIVE TOTAL REMOVED WELL VOLUMES	WATER CHARACTER pH	WATER CHARACTER CONDUCTIVITY	WATER CHARACTER TURBIDITY	COMMENTS

SAMPLE

WATER LEVEL MEASUREMENTS–FIELD DATA SHEET

JOB NO | [illegible]

PROJECT | INSPECTOR

OBSERVATION WELL	DEPTH TO WATER BELOW REF. PT. (FEET)	ELEVATION (FEET)			REMARKS; i.e. TIME, TEMPERATURE (°F)
		REFERENCE POINT	BOTTOM OF SCREEN	WATER LEVEL IN OBS. WELL	

SAMPLE

CHAIN OF CUSTODY RECORD

BECHTEL PROJECT NO. ______________________ SAMPLER'S NAME ______________________

LABORATORY PROJECT NO. ______________________ SAMPLER'S SIGNATURE ______________________

SITE IDENTIFICATION ______________________ BECHTEL SUPERVISOR ______________________

DATE ______________________

SAMPLE ID NUMBER	MATRIX OF SAMPLE	TIME TAKEN	PRESERVATIVES	ARCHIVE	ANALYZE	REMARKS

SAMPLE

RELINQUISHED BY ______________________ DATE/TIME ______________________ RECEIVED BY ______________________

RELINQUISHED BY ______________________ DATE/TIME ______________________ RECEIVED BY ______________________

RELINQUISHED BY ______________________ DATE/TIME ______________________ RECEIVED BY ______________________

RECEIVED BY ______________________ FOR LABORATORY, DATE/TIME ______________________

AUTHORIZED FOR DISPOSAL BY ______________________ TYPE OF DISPOSAL ______________________

RELINQUISHED TO ______________________ FOR DISPOSAL, DATE/TIME ______________________